REDACTED COPY

January 28, 2013

VIA ELECTRONIC SUBMISSION

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Washington, D.C. 20554

Re: Progeny LMS, LLC
Request for Confidential Treatment
Response of Progeny LMS, LLC
WT Docket No. 11-49

Dear Ms. Dortch:

Progeny LMS, LLC ("Progeny"), by its counsel and pursuant to Sections 0.457 and 0.459 of the Commission's Rules, 47 C.F.R. §§ 0.457, 0.459, hereby requests that the redacted portions of the attached Response of Progeny LMS, LLC ("Response") be treated as confidential and be withheld from public inspection. An unredacted version of the attached Response was filed with the Commission in this docket on January 11, 2013, is marked as confidential in ECFS, and this request relates directly to that filing. Progeny requests that this letter and the attached redacted version of the Response be included in the public record.

Pursuant to Section 90.353(d) of the Commission's rules[1] and paragraph 29 of the Commission's *Waiver Order*,[2] Progeny is required to demonstrate that its Multilateration Location and Monitoring Service ("M-LMS") network does not cause unacceptable levels of interference to Part 15 devices. On January 27, 2012, Progeny filed with the Commission the

[1] *See* 47 C.F.R. § 90.353(d).

[2] *See* Request by Progeny LMS, LLC for Waiver of Certain Multilateration Location and Monitoring Service Rules, *Order*, DA 11-2036, ¶ 29 (Dec. 20, 2011) ("*Waiver Order*") (granting conditional waivers of Sections 90.155(e) and 90.353(g) of the Commission's rules).

results of testing that were conducted in 2011 on behalf of Progeny by an independent third party testing firm, Spectrum Management Consulting Inc. ("SMC").[3]

At the request of the Commission, Progeny subsequently agreed to additional testing on a joint basis with three entities: Itron; Landis+Gyr Company ("Landis+Gyr"); and the Wireless Internet Service Providers Association ("WISPA"). The resulting reports address the tests that were conducted with each of the parties. One of the reports, the one prepared jointly with Itron, includes details about the equipment employed in the tests, its capabilities, and its performance, matters that Itron believes are commercial trade secrets. Progeny and Itron therefore jointly requested confidential treatment for the redacted portions of the test report.

The Commission subsequently placed the test reports on public notice for comment and parties filed comments on the reports on December 20, 2012. Progeny filed the attached Response to those comments on January 11, 2013. In discussing the Progeny/Itron joint test report, the attached Response addressed information that Itron redacted from the test report and claims to be confidential.

In support of this request, and in accordance with the requirements of Section 0.459(b) of the Commission's rules, 47 C.F.R. § 0.459(b), Progeny submit the following:

0.459(b)(1): Progeny seek confidential treatment for certain portions of the attached Response, primarily the distances between the Itron ERT and CCU devices tested, the distances between the Itron devices and the Progeny beacons, and the injected signal levels of the PER testing.

0.459(b)(2): Progeny filed the Response in WT Docket Number 11-49 following joint testing that Progeny undertook at the request of the Commission staff and in furtherance of the requirement that Progeny must demonstrate that its M-LMS network does not cause unacceptable levels of interference to Part 15 devices.

0.459(b)(3): Progeny's Response references information from the Part 15 Joint Test Report that Itron claims is highly sensitive, confidential, and proprietary commercial and technical information. Itron has informed Progeny that it treats such information as highly confidential and does not disclose it to third parties absent a Nondisclosure Agreement ("NDA"). In fact, Itron required Progeny to enter into an NDA prior to gaining access to Itron's technology and information. As such, Itron has informed Progeny that the redacted

[3] *See Coexistence of M-LMS Network and Part 15 Devices,* Spectrum Management Consulting Inc. (Jan. 27, 2012) ("*Part 15 Field Test Report*") (included as an attachment to *Letter from Bruce A. Olcott, Counsel to Progeny LMS, LLC, to Marlene H. Dortch, Secretary, Federal Communications Commission,* WT Docket No. 11-49 (Jan. 27, 2012) ("*Progeny Part 15 Field Test Report Filing*").

information in the Response qualifies as material that "would customarily be guarded from competitors" within the meaning of Section 0.457(d)(2) of the Commission's rules. In addition, Itron believes that the redacted portions of the Response would be protected from disclosure under the Freedom of Information Act ("FOIA") as "trade secrets and commercial or financial information obtained from a person and privileged or confidential." 5 U.S.C.A. § 552(b)(4).

0.459(b)(4): The redacted portions of the attached Response contain information that Itron believes are trade secrets and confidential information regarding the design and operation of Itron's AMR networks and devices. The market for AMR equipment is reportedly highly competitive and Itron indicates that it must protect its trade secrets in order to remain competitive with other providers of AMR equipment and services.

0.459(b)(5): Itron has informed Progeny that disclosure of the confidential information could compromise the ability of Itron to compete successfully with other providers of AMR equipment and services in this highly competitive industry. As a result, Itron has informed Progeny that the release of any portion of this information could compromise Itron's competitive edge in the AMR equipment industry, resulting in substantial competitive harm to Itron.

0.459(b)(6): Itron has indicated to Progeny that it does not permit the dissemination of its confidential trade secrets and proprietary information regarding its AMR equipment and methodologies to non-employees without the execution of a confidentiality agreement. Furthermore, all such confidentiality agreements require third party recipients of the information to request confidential treatment of the information as a part of any submission of any portion of the information to government agencies, such as the Commission. The NDA that Itron required Progeny to enter into included such a provision.

0.459(b)(7): The information contained in the attached Response is not available to the public.

0.459(b)(8): Progeny requests that the Commission permanently withhold the redacted information contained in the attached Response.

For the foregoing reasons, Progeny respectfully request that the redacted portions of the Response be granted confidential status and be withheld from public inspection. If confidential treatment is not granted for these redacted portions of the attached Response, Progeny request that all copies of the Response be returned to Progeny.

Please let us know if you have any questions.

Respectfully Submitted,

/s/ Bruce A. Olcott
Bruce A. Olcott
Squire Sanders (US) LLP
1200 Nineteenth Street, N.W.
Suite 300
Washington, D.C. 20036
(202) 626-6615 .
Counsel to Progeny LMS, LLC

REDACTED

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
The Wireless Telecommunications Bureau and the Office of Engineering and Technology Seek Comment on Progeny's Joint M-LMS Field Testing Reports	)	WT Docket No. 11-49

To: Chief, Wireless Telecommunications Bureau and
Chief, Office of Engineering and Technology

RESPONSE OF PROGENY LMS, LLC

Bruce A. Olcott
Preston N. Thomas
Squire Sanders (US) LLP
1200 Nineteenth Street, N.W.
Washington, D.C. 20036
(202) 626-6615

Its Attorneys

January 11, 2013

SUMMARY

Progeny LMS, LLC ("Progeny") has developed a highly accurate position location service that uses spectrum that was specifically allocated and licensed for this purpose in the 902-928 MHz band. Progeny's position location service could substantially benefit emergency first responders by accurately identifying the location of wireless callers to emergency E911 services, including wireless callers who are indoors and in tall buildings.

For nearly three years, Progeny has been operating a fully deployed version of its position location network on a test basis in Santa Clara County, California. Last year, Progeny also constructed and began operating initial deployments of its position location network in 39 other major cities across the country.

Progeny recently completed location accuracy testing of its network in cooperation with the Commission's Communications Safety Reliability and Interoperability Council ("CSRIC") Working Group 3, which is addressing the tremendous public safety need for accurate indoor location information to support E911. The results of the testing will be reported by CSRIC shortly and Progeny anticipates that they will show that Progeny's service can provide very accurate and reliable indoor location information to support emergency services (including the unique ability to identify floor-level vertical location information in tall urban buildings).

Meanwhile, Progeny has also been working for more than a year to carry out multiple rounds of compatibility testing to ensure that its position location service will not cause unacceptable levels of interference to Part 15 devices that also operate in the 902-928 MHz band. Progeny conducted a first round of tests in November 2011, releasing the results to the Commission in January 2012. The January 2012 Field Test Report demonstrated that not only does Progeny's multilateration location and monitoring service ("M-LMS") network refrain from

causing unacceptable levels of interference to Part 15 devices, in the vast majority of cases Part 15 devices are unable to detect the signals from Progeny's M-LMS network. Nonetheless, several parties representing Part 15 device manufacturers and users sought additional testing. Progeny therefore conducted further testing in July through September of 2012, completing cooperative testing with Itron, Inc., the Wireless Internet Service Providers Association ("WISPA"), and Landis+Gyr Company. Progeny filed test reports detailing the results of the joint testing with each respective party on October 31, 2012. Finally, the results of additional unilateral testing on Progeny's service were filed by Itron and one other party in December 2012.

In all, Progeny's network has been operating in Santa Clara County for nearly three years and has been operating in 39 other major cities nationwide for six months without resulting in interference to Part 15 devices. The spectrum sharing capabilities of Progeny's network have also been tested intensively by Progeny and others for nearly 18 months. The conclusion from each of these tests has been that Progeny's network does not cause unacceptable interference to Part 15 devices.

This successful co-existence is in large part a result of Progeny's inclusion of significant interference mitigation techniques in the design and operation of its M-LMS service. Far from avoiding its obligations to protect Part 15 devices, as some detractors suggest, Progeny has forgone the use of mobile return-paths and incorporated a low duty cycle, resulting in an M-LMS network that is exponentially more conducive to spectrum sharing than the design originally conceived of by the Commission. The interference mitigation techniques that Progeny has incorporated into the design and operation of it M-LMS network are extremely effective and constitute substantial concessions by Progeny as compared to what the Commission's rules for M-LMS licensees allow.

In their comments on the combined test results, the opposing parties seek to avoid the substantial evidence of Progeny's effective mitigation strategies and demonstrated co-existence with Part 15 devices by focusing on worst case and break case test results. Many of the concerns raised by the commenters relate to situations that do not, and often will not, occur in real world circumstances. Despite these characterizations, and indeed because of them, it is important to repeat that the standard of review for this proceeding is objective and based on actual Part 15 devices and conditions that exist in the 902-928 MHz band.

An inherent aspect of the Part 15 environment is the high level of existing sources of harmful interference in the band. Part 15 devices are designed to operate successfully in the 902-928 MHz band despite this interference. The ability of Part 15 devices to withstand or avoid harmful interference, however, is not unlimited. For this reason, the Commission established the requirement that M-LMS licensees must demonstrate that their networks will not cause "unacceptable levels of interference" to Part 15 devices, meaning harmful interference that Part 15 devices cannot withstand or avoid using the same types of interference mitigation techniques that they employ with each other.

The joint test results from July-September 2012 clearly demonstrate that Progeny's M-LMS system will not cause unacceptable interference to the devices tested. For instance, Progeny's joint testing of Automated Meter Reader ("AMR") devices with Itron and Landis+Gyr show continued normal operation and minimal reduction in data throughput. Importantly, any degradation of throughput attributable to Progeny's system was only a fraction, and often a small fraction, of the overall degradation that the tested AMR devices experienced from other sources in the 902-928 MHz band. The tests show that the interference mitigation techniques used by AMR devices to manage existing interference in the band are equally effective at overcoming

and avoiding the marginal additional noise attributable to Progeny's system, even when operating directly co-frequency and even co-located with Progeny's transmitters.

The supplemental packet error rate ("PER") tests, carried out unilaterally by Itron in October 2012, add little to the analysis. Their methodology is far from transparent and relies on theoretical values that do not reveal anything about the functioning of actual Part 15 devices in the presence of Progeny's position location service. Despite these shortcomings, however, they show that even in worst case or break case scenarios, AMR devices still operate reliably and efficiently in the presence of Progeny's service.

Joint testing with the Wireless Internet Service Providers Association ("WISPA") also confirmed that Fixed Wireless Broadband ("FWB") networks can operate in the presence of Progeny's M-LMS system. FWB networks were by far the most intolerant devices with respect to their ability to withstand interference, and this intolerance required significant constraints on the design of the joint tests in order to limit interference from existing interference sources in the 902-928 MHz band prior to evaluating the effect of Progeny's system. Nonetheless, the co-channel tests of Progeny's network with leading types of FWB equipment revealed that FWB networks continued to operate reliably and experienced an average data throughput reduction of only 24.4 percent. As with the constraints built into the test design, much of the data throughput reductions that may have been attributable to Progeny's network could be resolved using relatively minor adjustments to the FWB link configurations. FWB network operators say they use 900 MHz FWB equipment only in very rural areas, rather than the urban and suburban areas where Progeny's service is most needed. In rural areas, Progeny's service is likely to operate solely as a supplement to GPS, requiring relatively few M-LMS transmitters. As a result,

overlaps in Progeny's service area with that of FWB networks will be limited and Progeny will be able to work with FWB network operators to minimize the potential for interference.

A few parties introduced new arguments regarding the possibility of interference to other Part 15 devices. None of these new arguments raises legitimate concerns regarding the spectrum sharing capability of Progeny's position location service. The comments of GE Digital Energy and GE MDS LLC raise the issue of the potential for overload to Part 15 devices, a concern that has been investigated previously in this proceeding and has been shown to be unsubstantiated by repeated testing. The test data provided by Plantronics, Inc. shows that its wireless headsets cannot detect Progeny's position location signals unless the automatic channel selection functions of the devices are disabled. Plantronics tested its wireless headsets in an arguably worst case condition (about one block from a Progeny transmitter) and, even then, the headsets could not detect the signals of Progeny's service unless the headsets were separated from their base stations by at least 20 feet with their automatic channel selection capabilities disabled.

Inovonics Wireless Corporation ("Inovonics") expressed concern that Progeny's system could interfere with its security and senior care products. However, like other Part 15 devices, Inovonics' devices employ Frequency Hopped Spread Spectrum ("FHSS") technology, which Progeny extensively tested during its independent testing in 2011 and again during the joint testing in 2012. In each of these tests, FHSS devices functioned as intended in the presence of Progeny's system without interruption. Finally, Starkey Laboratories submitted comments regarding interference with its assistive hearing devices, some of which use the 902-928 MHz band. In previous filings before the Commission, however, Starkey has explained that the design of its devices employ an adaptive frequency selection algorithm to successfully share spectrum with other devices, including with LMS networks specifically.

With regard to the Non-Multilateration Location and Monitoring Service ("NM-LMS"), to the extent that Progeny's M-LMS system will share spectrum with NM-LMS users, Progeny's service can function cooperatively with these networks. Most NM-LMS networks operate in the 915 MHz band, well below Progeny's licensed frequencies. If NM-LMS networks do operate in the spectrum that the Commission allocated on a co-equal basis to NM-LMS and M-LMS licensees, Progeny's beacon deployment plans (focusing primarily on the highest available points, such as on broadcast, paging, and cellular towers) should facilitate spectrum sharing with NM-LMS networks, which are installed almost exclusively on highways.

Based on this extensive factual record, the Commission should promptly conclude that the testing that has been completed during the past 18 months on Progeny's M-LMS network has clearly demonstrated that its M-LMS network will not cause unacceptable levels of interference to Part 15 devices, and the Commission should therefore authorize Progeny to make its critically-needed position location service available to the public safety community, wireless carriers, and consumers without delay.

TABLE OF CONTENTS

REDACTED

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
The Wireless Telecommunications Bureau and the Office of Engineering and Technology Seek Comment on Progeny's Joint M-LMS Field Testing Reports	)	WT Docket No. 11-49

To: Chief, Wireless Telecommunications Bureau and
Chief, Office of Engineering and Technology

RESPONSE OF
PROGENY LMS, LLC

Progeny LMS, LLC ("Progeny"), through its attorneys, hereby responds to the comments that were filed in response to the Commission's public notice addressing the results of joint testing that Progeny undertook with three Part 15 spectrum users in order to demonstrate that its Multilateration Location and Monitoring Service ("M-LMS") network will not cause unacceptable levels of interference to Part 15 devices.[1]

Progeny has been operating its M-LMS network for nearly three years in Santa Clara County without interference to Part 15 devices. During this period, there have been three rounds of extensive Part 15 testing with Progeny's network: (1) independent testing that Progeny commissioned in the fall of 2011,[2] (2) joint testing that was conducted between Progeny and the

[1] *The Wireless Telecommunications Bureau and the Office of Engineering and Technology Seek Comment on Progeny's Joint M-LMS Field Testing Reports*, Public Notice (rel. Nov. 20, 2012) ("*Public Notice*").

[2] *See Demonstration of Compliance with Section 90.353(d) of the Commission's Rules*, Progeny LMS, LLC, WT Docket No. 11-49 (filed Jan. 27, 2012) ("*January 2012 Field Test Report*").

Part 15 parties during the summer and fall of 2012,[3] and (3) a final round of unilateral frequency sampling that Itron apparently conducted in October 2012.[4] Additional unilateral testing may have also been conducted in downtown San Jose on December 14, 2012 by Plantronics, a manufacturer of Part 15 wireless headsets.[5]

The test results are considerable. The findings, however, are unequivocal – Progeny's M-LMS network can share the 902-928 MHz band with Part 15 devices in the same manner that Part 15 devices share the spectrum with each other, using a combination of techniques that minimize the interference caused to, and received from, other authorized spectrum users. Progeny designed its M-LMS network taking into consideration the spectrum sharing techniques that Part 15 devices employ with each other. Because of this, Part 15 devices that operate successfully today in the 902-928 MHz band will continue to do so across the entire band once Progeny's position location service is fully operational.

The spectrum sharing capabilities of Progeny's network are demonstrated not only by the extensive testing that has been completed, but also by the fact that Progeny is operating a fully deployed M-LMS network in the San Francisco Bay Area and is also operating initial M-LMS networks in 39 other major Economic Areas ("EA").[6] Most of these M-LMS networks have

---

[3] Progeny & Itron Part 15 Test Report, WT Docket No. 11-49 (filed Oct. 31, 2012) (*"Progeny & Itron Joint Testing")*; Progeny & Landis+Gyr Part 15 Test Report, WT Docket No. 11-49 (filed Oct. 31, 2012) ("*Progeny & Landis+Gyr Joint Testing*"); Progeny & WISPA Testing Part 15 Test Report, WT Docket No. 11-49 (filed Oct. 31, 2012) ("*Progeny & WISPA Joint Testing"*) (collectively "*Joint Part 15 Test Reports").*

[4] Itron Second Round Test Results – Progeny System, WT Docket No. 11-49 (filed Dec. 17, 2012) (*"Itron Unilateral Testing"*).

[5] *Comments of Plantronics*, WT Docket No. 11-49 (filed Dec. 20, 2012) (*"Plantronics Comments"*).

[6] *Supplement to Progeny Request for Waiver and Limited Extension of Time*, File Numbers: 0005273211-0005273290, et al., WT Docket No. 12-202 (filed Nov. 21, 2012).

been operating on a test basis for more than six months and, as noted above, Progeny's fully deployed network in Santa Clara County has been operating on a test basis for nearly three years without resulting in interference to Part 15 devices.[7]

Progeny's detractors seek to avoid these facts by focusing only on a few worst case and break case test results, including results involving test conditions that do not, and often could not, exist in real life. They have tested Part 15 devices with their interference mitigation techniques disabled (such as preventing frequency hopping devices from hopping) even though such devices could not operate successfully (or compliantly) in the 902-928 MHz band as it exists today.

They have also tried to argue that Part 15 devices will routinely experience high duty cycles from Progeny's M-LMS beacons even though such duty cycles were detected in testing only when Part 15 receivers were placed on tall 25 to 50 foot poles with direct line of sight of multiple M-LMS beacons. Part 15 devices cannot operate in such conditions without the use of significant interference avoidance technologies. That is why most Part 15 devices are instead marketed for use in less noisy conditions, such as indoors or outdoors at ground level, where they will experience very low M-LMS duty cycles, if they detect them at all.

The Part 15 Parties also claim that Progeny's M-LMS signal will make unusable a significant portion of the 902-928 MHz band, with Itron claiming that Progeny's service will make 4 MHz of the band unavailable[8] and WISPA claiming that 60 percent of the band will be unavailable for its devices.[9] Both of these claims are unsupported by the facts. Itron's claim

---

[7] *See* Commlabs, Inc., Application for Experimental License, File Nos. 0563-EX-ST-2009 (Call Sign WE9XEP), (Granted Jan. 22, 2010) through 0173-EX-RR-2012 (Call Sign WF2XLW) (Granted Jun. 7, 2012).

[8] *Comments of Itron, Inc.*, WT Docket No. 11-49, at 73 ("*Itron Comments*").

[9] Comments of the Wireless Internet Service Providers Association, WT Docket No. 11-49 at 4 (filed Dec. 21, 2012) ("*WISPA Comments*").

ignores the results of system level tests on its equipment and is instead based on theoretical packet error rate ("PER") tests that only look at performance over a 200 kHz channel as well as unrealistically reach down into the noise floor (*i.e.*, xxxx dBm) to try to support its argument. WISPA's claim ignores test results that demonstrate that WISP networks can operate successfully co-frequency with Progeny's service even in worst case conditions that are highly unlikely to exist in real life.

The Part 15 parties have also fabricated a worst case test result, repeatedly claiming that one test of a WISP device recorded transmission degradation of 62.2 percent.[10] WISPA created this fictitious statistic by combining data loss percentages in the both inbound and outbound direction, effectively aggregating the numerator while failing to double the denominator, resulting in an invalid percentage based on an impossible total transfer rate of 200 percent (or more appropriately, a data loss percentage that is half of what is claimed).

But perhaps the most egregious tactic of the Part 15 parties is cherry picking a handful of theoretical and, in the case of WISPA, invalid data points and attempting to make sweeping claims about the potential for interference to all Part 15 devices in all operating conditions. In this regard, it is critical to keep in mind that different types of Part 15 devices are designed for different types of uses and operating conditions, and the interference mitigation techniques that they employ are specifically selected for the intended application or market. Some Part 15 devices include very robust mitigation measures that allow them to operate successfully in very noisy environments. Others are designed to operate successfully primarily indoors and at relatively short (i.e., less than 100 feet) distances. Still other devices operate successfully only in

[10] *See WISPA Comments* at 5-6.

limited geographic conditions, such as in very rural environments where competing Part 15 noise sources are less numerous.

An example of this is 900 MHz fixed wireless broadband ("FWB") systems.[11] Numerous letters were filed by Wireless Internet Service Providers ("WISPs") explaining that 900 MHz FWB systems are exceedingly intolerant to interference and even a baby monitor "will blow up" FWB links "to any customer within the nearby area."[12] Because of this, most WISP operators say they use 900 MHz FWB equipment only in very rural environments.[13]

In raising these points, Progeny is not suggesting that some Part 15 devices deserve more or less interference protection than others. Instead, each Part 15 device warrants sufficient protection so that it can continue to operate using the same interference mitigation techniques that it employs today. The extensive tests that have been conducted during the past year demonstrate that Progeny's position location service operates compatibly with Part 15 devices because Progeny's M-LMS network uses many of the same interference mitigation techniques that Part 15 devices use with each other. Progeny's demonstration of this fact, however, is not based on sweeping generalizations or exaggerations of the test results. Instead, Progeny individually addresses each of the Part 15 equipment types that were tested and explains why

[11] FWB is the term that WISPA utilizes for these devices, so Progeny will use this term as well.

[12] *See* Letter from Phil Lambert, General Manager, Q-Wireless, LLC, to Marlene H. Dortch, Secretary, Federal Communications Commission, WT Docket 11-49, at 1 (filed Dec. 19, 2012) ("*Q-Wireless Letter*") (further noting that interference to 900 MHz FWB also results from "invisible dog fences, water tanks SCADA systems and farmers' GPS equipment").

[13] *See e.g.* Comments of Joink, LLC, WT Docket 11-49, at 1 (filed Dec. 21, 2012) ("*Joink Comments*"); Comments of NetsurfUSA Inc, WT Docket 11-49, at 1 (filed Dec. 21, 2012) ("*Netsurf Comments*"); Comments of Fourway Computer Products, Inc., WT Docket No. 11-49 at 1 (filed Dec. 19, 2012) ("*Fourway Comments*").

Progeny's service can share the 902-928 MHz band with them and with other Part 15 devices as well. In summary, the three rounds of Part 15 testing reveal the following:

Automated Meter Readers – AMR networks are designed to operate primarily in two configurations, with AMR receivers mounted either on vehicles for mobile use or elevated on fixed 25 to 50 foot poles. In this latter configuration they are exposed to substantial line-of-sight interference from all sources and are often at significant distances from AMR transmitters. AMR networks overcome these conditions using two primary techniques, frequency hopping and retransmitting data to ensure its receipt.

The signals from Progeny's beacons increased the packet loss rate for AMR receivers by an average of 0.12% (for Landis+Gyr devices) to 8.1% (for Itron devices) in the tests that were conducted. In contrast, the Itron devices experienced average packet loss rates of about 40% from other noise sources during the tests. Further, the AMR devices were able to successfully transmit data on channels that were directly co-frequency with Progeny's service in normal operating conditions.

900 MHz FWB Systems – FWB networks are marketed for the purpose of transmitting data over multiple miles. FWB equipment employs such interference mitigation measures as manual channel selection, site selection for shielding, and antenna selection for directionality. In tests of FWB networks directly pointed at large numbers of Progeny transmitters, FWB data throughput was totally unaffected on frequencies adjacent to Progeny's carriers, and co-frequency operations experienced reductions averaging 24.4%, but which varied substantially (from a low of 2.5% to a high of 49%) depending on the configuration of the FWB devices.

WISP operators use 900 MHz FWB equipment primarily in very rural areas. The critical public safety need for Progeny's service is in urban and suburban areas and any deployment of its network in very rural areas would involve relatively few beacon transmitters, primarily to augment GPS. Progeny is therefore willing to work with 900 MHz WISP operators to ensure that any interference that might result in these areas is minimal.

Other Part 15 Devices – Most Part 15 devices operate at distance that are typically less than 100 feet, as compared to AMR and FWB devices that seek to span longer distances. Progeny commissioned extensive testing on such devices and additional testing was apparently conducted by Plantronics.

The tests consistently show that Progeny's service will not prevent Part 15 devices from functioning properly and conveying their desired signals. The normal interference mitigation features of these devices (generally variable channel selection in older analog devices and frequency hopping or spread spectrum in newer equipment), are fully capable of operating effectively to avoid any impact from Progeny's signal in the exact same manner that they currently avoid other Part 15 devices and noise sources.

Part 15 Receiver Overload – One of the goals of the Part 15 test process was to determine whether Progeny's M-LMS signals could overload the receivers of Part 15 devices, preventing them from operating. None of the joint or unilateral tests evidenced any instances of receiver overload to Part 15 devices and, therefore, speculative arguments regarding the possibility of receiver overload should be disregarded.

Obviously, further detail and discussion is warranted regarding the above summarized test results and Progeny provides this analysis in subsequent sections of this response. As a prerequisite, however, Progeny addresses the standard of review in this proceeding – the Commission's definition of unacceptable levels of interference.

I. THE STANDARD OF REVIEW IN THIS PROCEEDING IS OBJECTIVE AND IS BASED ON REAL WORLD SPECTRUM SHARING CONDITIONS IN THE 902-928 MHz BAND

Although no party has seriously challenged Progeny's interpretation of the spectrum sharing threshold that Progeny must satisfy, reiteration of the standard is appropriate. The Commission's rules require that Progeny demonstrate that its M-LMS network will not cause unacceptable levels of interference to Part 15 devices.[14]

This standard is necessarily objective. Thus, statements by the Part 15 parties that Progeny's service "will degrade the operations of unlicensed users to levels that are unacceptable

[14] *Request by Progeny LMS, LLC for Waiver of Certain Multilateration Location and Monitoring Service Rules*, Order, DA 11-2036, ¶ 6 (Dec. 20, 2011) ("*Progeny Waiver Order*").

to the tested parties and the Coalition" are unavailing.[15] Further, the Commission's threshold for "unacceptable levels of interference" is higher than the threshold for "harmful interference." In this regard, Landis+Gyr incorrectly asserts that "it is clear that Progeny's burden in satisfying the waiver condition was to prove that even a lesser impact [than harmful interference] would not occur to Part 15 devices."[16] In fact, when the Commission established its standard of unacceptable levels of interference, it repeatedly stated that "unlicensed Part 15 devices in the 902-928 MHz band, as in any other band, may not cause harmful interference to and must accept interference from all other operations in the band."[17]

Although Part 15 devices are required to accept harmful interference, both from other Part 15 devices and from M-LMS networks, the Commission recognized that the potential resiliency of unlicensed Part 15 devices is not unlimited.[18] Therefore, the Commission directed that the harmful interference that M-LMS licensees cause to Part 15 devices must not reach the point that it constitutes "unacceptable levels of interference."[19]

In defining the term "unacceptable levels of interference," the Commission borrowed language directly from its definition of harmful interference, which is interference that "seriously

---

[15] *Comments of the Part 15 Coalition*, WT Docket No. 11-49, at 1 (filed Dec. 21, 2012) ("*Part 15 Parties Comment*").

[16] Comments of Landis+Gyr, WT Docket No. 11-49, at 3 n.5 ("*Landis+Gyr Comments*").

[17] *Amendment of Part 90 of the Commission's Rules to Adopt Regulations for Automatic Vehicle Monitoring Systems, PR Docket No. 93-61*, Report and Order, 10 FCC Rcd 4695, 4714, ¶ 35 (PR 1995) ("*M-LMS Order*") (citing 47 C.F.R. § 15.5(b)).

[18] *See id.* at 4714 (explaining that "we have decided to balance the equities and value of each use without undermining the established relationship between unlicensed operations and licensed services").

[19] *See* 47 C.F.R. § 90.353(d).

degrades, obstructs or repeatedly interrupts" the functioning of a device.[20] Employing this same language, the Commission explained that its "unacceptable levels of interference" requirement is intended to ensure that M-LMS networks "are not operated in such a manner as to *degrade, obstruct or interrupt* Part 15 devices *to such an extent* that Part 15 operations will be negatively affected."[21] In other words, unacceptable levels of interference means harmful interference that Part 15 devices are incapable of withstanding or avoiding using the various interference mitigation techniques typically employed by Part 15 devices to withstand or avoid harmful interference from other such devices and from other authorized users of the 902-928 MHz band.

Such an approach is appropriate because it is objective and focuses on real world spectrum sharing conditions in the 902-928 MHz band. Further, as explained below, it necessitates testing using actual Part 15 devices deployed in their actual operating conditions in the 902-928 MHz band, which is what Progeny has done.

A. The Standard of Review Addresses Actual Part 15 Devices that Operate in the 902-928 MHz Band

Progeny endeavored in each round of Part 15 testing to design and conduct tests that used actual Part 15 devices in their actual operating conditions. Thus, spread spectrum and frequency hopping devices were permitted to operate in this manner, and devices that operate solely on one or a few channels of the 902-928 MHz band were tested in this manner as well.

In its comments, Itron advocates at least a portion of this approach arguing that "Progeny must show that its transmissions do not cause unacceptable interference to unlicensed devices

[20] 47 C.F.R. § 15.3(m); *see also* 47 C.F.R. § 2.1(c).

[21] *See Amendment of Part 90 of the Commission's Rules to Adopt Regulations for Automatic Vehicle Monitoring Systems,* Order on Reconsideration, 11 FCC Rcd 16905, 16912 (1996) ("*M-LMS Reconsideration Order*") (*emphasis added*).

that operate co-frequency with it."[22] As indicated in the comprehensive results of tests that Progeny filed with the Commission in January 2012, that is exactly what Progeny did – whenever it identified a device that could operate solely on Progeny's frequencies (either because it operated only on one frequency or because it had manual channel selection that could be set to Progeny's frequencies) Progeny tested the device in this manner.[23] These tests clearly demonstrated that Progeny's service would not cause unacceptable interference to such devices.[24]

Itron, however, does not manufacture any such devices. Nor does Landis+Gyr. In fact, a cursory review of the list of recent Part 15 equipment certifications that the Part 15 parties included as Attachment C to their comments indicates that relatively few new Part 15 devices are designed to operate in the upper portion of the 902-928 MHz band and nearly all of those that can are frequency hopping or spreading devices that operate across all or much of the entire band.[25]

Progeny tested a sampling of each of these types of devices under normal operating conditions without alteration or modification to the device. The results of Progeny's tests therefore accurately reflect the actual operating conditions that exist in the real world.

---

[22] *Itron Comments* at 7.

[23] *January 2012 Field Test Report* at 7 (Testing was carried out "intentionally employing the same channel setting on the Part 15 device as the [M-LMS] beacon even if other channels were available, or by physically preventing, if possible, a Part 15 device from automatically shifting to a non-[M-LMS] channel.")

[24] *Id*. at 10 ("Even when a Part 15 device is operated in an atypical co-channel state with the [M-LMS] beacon (either through manual channel selection or by overriding the automatic selection function), nearly all of the nine Part 15 devices…could not detect the [M-LMS] beacon in most test scenarios.")

[25] *Part 15 Parties Comments* at 3 n.10 and Attachment C.

Itron, however, bluntly accuses Progeny of misusing the interference mitigation capabilities of some Part 15 devices to demonstrate that its M-LMS network will not cause unacceptable levels of interference. Itron asserts that "the fact that Progeny's focus has been to argue that unlicensed users can somehow work around its system, by, for example, frequency hopping and using the remaining channels on the band, tells the FCC that even Progeny recognizes that unlicensed users cannot function co-frequency with its system."[26] As noted above, however, Progeny did test Part 15 devices that operate directly co-frequency with Progeny's network, often employing manual channel selection to force them to do so. The results of these tests demonstrate that Progeny's service will not cause unacceptable levels of interference to such devices.

Albeit unstated, what Itron appears to seek is for Progeny's system to have no impact even when the interference mitigation capabilities of their equipment are disabled, even though such operation would violate Part 15 certification requirements and expose Itron's equipment to interference from other noise sources in the band. Itron structures a set of contrived tests involving an unrealistic combination of worst case technology and worst case conditions, such as operating a single channel narrowband Part 15 receiver outdoors on a 50 foot tower a mile or more from the desired Part 15 transmitter and within direct line-of-sight to multiple Progeny beacons. This appears to be the test that Itron simulated in its July and October PER tests.[27]

As discussed below, Itron's PER tests do not reveal anything unexpected or probative. Itron's PER tests are entirely theoretical and do not show how actual Part 15 devices perform in actual system level tests. All that the PER tests revealed is that Progeny's service will inject

[26] *Itron Comments* at 7.

[27] *See Itron Unilateral Testing* at 8.

signal energy into a small portion of the band just the same as countless other devices that operate in the 902-928 MHz band, including some devices that were shown in Itron's PER tests to have a significant impact on the band. The signal energy from Progeny's service, however, will not prevent Part 15 devices from operating in the band, including in the specific 4 MHz utilized by Progeny's beacons.

Itron's contrived PER tests are also irrelevant. Itron's tests are based on a channel occupancy of 200 kHz. Part 15 devices that are designed to achieve high data rate and/or long range communications in noisy environments must use "digital modulation" techniques in order to operate at the highest permissible Part 15 power levels. Section 15.247 of the Commission's rules requires that such systems generally employ wideband modulation, which was originally defined as FHSS or DSSS, then expanded to include any digitally modulated carrier with a minimum of 500 kHz 6 dB carrier bandwidth.[28]

Therefore, no manufacturer could market a Part 15 devise that is designed to span significant distances in outdoor environments using a single channel 200 kHz carrier transmission. It is therefore irrelevant whether such a single channel 200 kHz device could operate successfully in the presence of Progeny's M-LMS transmitters.

Instead, what Progeny was required to demonstrate, and what it did demonstrate, was that its M-LMS network can operate successfully without causing unacceptable levels of interference to the Part 15 devices that actually do operate and that businesses and consumers actually do use in the 902-928 MHz band. For this reason, Progeny has demonstrated that its M-LMS network will not cause unacceptable levels of interference.

[28] 47 C.F.R. § 15.247(a).

B. The Standard of Review Addresses the Actual Conditions of the 902-928 MHz Band

In defining the standard of review in this proceeding, it is important to employ objectivity not just with respect to the types of Part 15 devices that are tested, but also with respect to their operating conditions. In this regard, a critical issue in each of the tests was defining the appropriate distance between a Part 15 transmitter and Part 15 receiver under test – the closer such devices are to each other, the less prone they are to interference.

Throughout each of the test processes, Progeny consistently erred toward worst case conditions, separating the Part 15 transmitter and receiver to the point where a reliable signal could not be maintained (with Progeny's network off) and then moving them closer together until a reliable connection existed (still with Progeny's network off). This approach was employed in the Part 15 tests that Progeny commissioned in the fall of 2011, and it was also employed in the tests with Itron, Landis+Gyr and, to the practical extent possible, WISPA.[29] There was no justifiable reason to test Part 15 devices at a greater operating distance – if a Part 15 device cannot maintain a reliable connection at a certain distance in the existing Part 15 noise environment, it is irrelevant whether the Part 15 device can operate at that same distance in the presence of Progeny's M-LMS network.

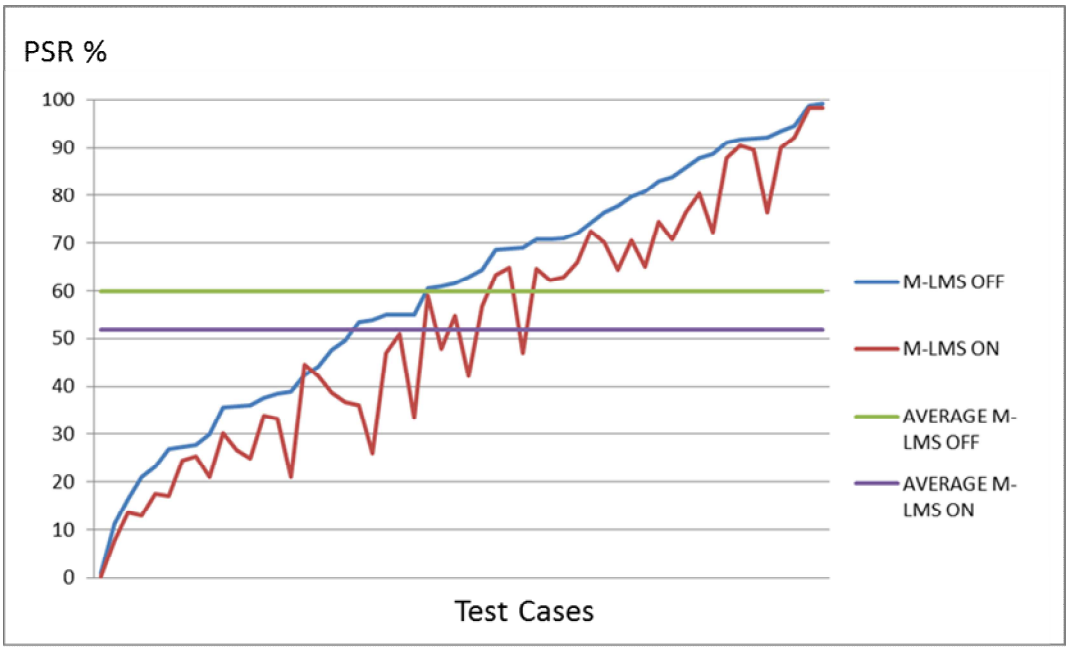
In most cases, however, when Part 15 transmitters and receiver were moved further apart, they did not simply stop working. Instead, their throughput success rates began to drop (with Progeny's network turned off). It was necessary to document this trend in the test results in order to define a reasonable edge of performance expectation for the Part 15 devices under test. After all, if a Part 15 device is operated in a manner that only half the desired data packets get

[29] *January 2012 Field Test Report* at 40*; see e.g. Progeny & Landis+Gyr Joint Testing* at 2, *Progeny & WISPA Joint Testing* at 3.

through (with Progeny's network off), is it reasonable to expect that the addition of Progeny's network should be permitted to increase that degradation somewhat further (particularly if the resulting increase from Progeny's network is only a small fraction of the interference caused by other noise sources).

This is a major point that Progeny was making in its October 31, 2012 letter that was filed concurrently with the Part 15 parties' test results.[30] The chart below was included in the letter and clearly shows that, for each of the Itron equipment tests, the transmission loss that was attributable to Progeny's service was only a small fraction of the transmission loss caused by other noise sources. The chart shows the throughput success rates for each of the tests of Itron equipment in spectrum shared with Progeny sorted with the configurations that produced the lowest throughput success rate percentage with the Progeny network off to the left side of the graph and the configurations that produced the highest throughput success rate percentage with Progeny's network off to the right side of the graph.

[30] *Letter from Bruce A. Olcott, Counsel, Progeny LMS, LLC, to Marlene H. Dortch, Secretary, Federal Communications Commission*, WT Docket No. 11-49, at 2-3 (filed Oct. 31, 2012) ("*October 31 Letter*").



Aggregate Throughput Success Percentages for Itron Equipment

As indicated in the graph, even when the interference from other noise sources (with Progeny's network off) pushed the data throughput success rate of Itron's equipment down to near zero (primarily because of increased distance between the Itron transmitter and receiver), the additional interference attributable to Progeny's service stayed largely unchanged (hovering around eight percent).[31] This trend was even more striking in the Landis+Gyr test results with virtually no difference in the data throughput success rates with Progeny's network toggled between on and off.[32]

[31] *Id.* (The average data throughput success rate of Itron's equipment with Progeny's network turned *off* was 59.9%. Once Progeny's network was turned on, the average throughput success rate dropped by 8.1%, to 51.8%.)

[32] A graph of the Landis+Gyr results similar to the one above for Itron would have to have been filed with the Commission under a request for confidential treatment pursuant to Landis+Gyr's redaction instructions and Progeny has instead chosen to refrain from including such a chart in this pleading.

In its comments, Landis+Gyr chastises Progeny for comparing the interference levels from its M-LMS network with the interference levels that are already caused to Part 15 devices by other noise sources in the 902-928 MHz band. Landis+Gyr asserts:

> Gratuitous suggestions that [Part 15] devices do not achieve 100% throughput at all times and/or have been designed to mitigate the noisy environment in which they operate do not meet Progeny's burden of proof. Those facts have never been in dispute; to the contrary, it is well recognized that the Part 15 community consists of millions, if not tens of millions of devices regularly operating efficiently and effectively in admittedly "noisy" consumer, commercial and industrial environments. And these devices do so because their manufacturers recognize the "shared" nature of the band and design accordingly, even as various new devices are regularly added to that mix for extremely valuable purposes, without seriously degrading the performance of the incumbent base.[33]

Progeny does not dispute Landis+Gyr's primary assertion.[34] Certainly the fact that Part 15 devices already experience considerable interference from other Part 15 devices does not satisfy Progeny's burden of proof. The existence of this already noisy environment, however, is clearly relevant to Progeny's burden of proof because it sets an objective standard against which the spectrum sharing capabilities of Progeny's service can be assessed. Any other approach would set the bar for Progeny's primary service at a higher threshold than what exists for secondary Part 15 devices with respect to the manner in which they share spectrum with each other.

---

[33] *Landis+Gyr Comments* at 4.

[34] Progeny notes, however, that Landis+Gyr's rosy depiction of the spectrum sharing environment in the 902-928 MHz band is directly at odds with its characterization of the sharing conditions that it expressed (under its marketing name, Cellnet) in Docket 03-201. *See* Cellnet Technology, Inc. Petition for Limited Reconsideration, Docket No. 03-201 (filed Oct. 7, 2004) ("Cellnet has identified in recent months a potentially disturbing trend of manufacturers of devices utilizing digital modulation to develop products that do not utilize any duty cycle and that operate at the maximum permitted limits, without regard to the above-referenced requirements. As a result, new entrants to the band are creating emissions at interfering levels that are virtually unavoidable by incumbent devices, no matter how well, efficiently or cleverly the incumbent devices may have been designed to operate in the presence of other low powered users.")

In determining whether Progeny's service causes unacceptable levels of interference to Part 15 devices it is therefore necessary and appropriate only to test actual Part 15 devices in the actual operating conditions in which they successfully operate in the 902-928 MHz band. Progeny satisfied this requirement by designing its network to employ many of the same interference mitigation techniques that are already employed by Part 15 devices. As discussed below, these interference mitigation techniques are significant and highly effective – ensuring that Part 15 devices that successfully operate today in the 902-928 MHz band will continue to do so once Progeny initiates its commercial position location service.

II. PROGENY'S INTERFERENCE MITIGATION TECHNIQUES CONTRIBUTE SUBSTANTIALLY TO SPECTRUM SHARING IN THE 902-928 MHZ BAND

The Commission's rules do not require M-LMS licensees to employ specific mitigation techniques to limit interference to Part 15 devices. This is instead expressed as an objective, with the intent of ensuring that M-LMS licensees "take into consideration a goal of minimizing interference to existing deployments or systems of Part 15 devices in their area, and to verify through cooperative testing that this goal has been served."[35]

In furtherance of this goal, Progeny incorporated extensive interference mitigation techniques in the design and operation of its M-LMS network. As the Commission has recognized, Progeny's M-LMS network "offers the potential for significantly improved location based services" and also "takes the goal of minimizing interference to other users into account."[36]

---

[35] *Amendment of Part 90 of the Commission's Rules to Adopt Regulations for Automatic Vehicle Monitoring Systems*, Memorandum Order and Opinion and Further Notice of Proposed Rulemaking, 12 FCC Rcd 13942, 13968, ¶ 69 (1997) ("*LMS MO&O*")

[36] *Progeny Waiver Order,* ¶¶ 18 and 26 (granting conditional waivers of Sections 90.155(e) and 90.353(g) of the Commission's rules).

Some parties have criticized Progeny's mitigation efforts, arguing that Progeny has sought "rule concessions" from the Commission[37] and suggesting that its system design and mitigation techniques may actually worsen its spectrum sharing capabilities as compared to the M-LMS network configuration that is dictated by the Commission's rules.[38] Even a cursory comparison of Progeny's M-LMS network design with the specifications that are included in the Commission's rules demonstrates that such arguments are not credible.

The interference mitigation techniques that Progeny has incorporated into the design and operation of it M-LMS network are substantial, extremely effective, and constitute substantial concessions *by Progeny* as compared to what the Commission's rules for M-LMS licensees allow. Progeny's interference mitigation techniques will produce exponentially less signal energy and interference in the 902-928 MHz band as compared to the M-LMS network design that was specified in the Commission's rules. Progeny's interference mitigation techniques are also a critical component to Progeny's demonstration that its position location service will not cause unacceptable levels of interference to Part 15 devices.

A. The Elimination of M-LMS Return Path Links is a Tremendous Benefit to Spectrum Sharing in the 902-928 MHz Band

Section 90.155 of the Commission's rules requires that M-LMS networks operate using three potentially high-power transmission paths, pursuant to which M-LMS based stations:

(1) "interrogate a mobile,"

(2) "receive the response at three or more sites,"

---

[37] Comments of GE Digital Energy and GE MDS LLC, Docket No. 11-49, at 5 (filed Dec. 21, 2012) ("*GE Comments*").

[38] *See Itron Comments* at 4; Comments of Inovonics Wireless Corporation, WT Docket No. 11-49, at 2 n.2 (filed Dec. 20, 2012) ("*Inovonics Comments*").

(3) "compute the location from the time of arrival of the responses and"

(4) "transmit the location either back to the mobile or to a subscriber's fixed site."[39]

Pursuant to this rule, an M-LMS network must include both (1) base stations spaced very close together throughout the coverage area (they must be very closely together in order to successfully receive responses from each mobile unit at three or more sites) and (2) mobile units that transmit in the 902-928 MHz band at a sufficient power level to successfully communicate back to at least three surrounding M-LMS base stations.

The base station density of such an M-LMS network would necessarily be very high, potentially higher than a cellular network where each mobile unit has to communicate back to only one base station.[40] Such an M-LMS network would create significant noise in the 902-928 MHz band, emanating repetitive transmissions not just from base stations, but also from mobile units operating in immediate proximity to Part 15 devices throughout the coverage area.

As observed by GE Digital Energy and GE MDS LLC ("GE") in their comments, under the Commission's rules, these mobile units would be limited primarily (although not entirely) to vehicles.[41] This prohibition was adopted with the express intent of limiting the sheer number of highly disruptive return path transmissions that were likely to operate in the band.[42] As the

[39] 47 C.F.R. § 90.155(e).

[40] *Progeny Waiver Order*, ¶ 24 ("[T]he Commission's rules for M-LMS do not limit the number of sites or the level of geographic area coverage for an M-LMS licensee. Thus, an operator may build as many sites as are necessary to provide service.")

[41] *GE Comments* at 4 n.8.

[42] *See M-LMS Order*, ¶ 23.

Commission recognized when it created M-LMS, "reverse link transmissions could present significant problems to Part 15 operations."[43]

A far more effective interference mitigation approach is the one employed by Progeny – eliminate M-LMS mobile transmitters and reverse link transmissions in the 902-928 MHz band altogether. By eliminating these return paths, it no longer matters how many mobile units are being tracked and whether those mobile units are vehicles or other devices. Eliminating return paths also greatly reduces necessary tower density because base stations no longer have to be packed sufficiently close together to receive return transmissions at three or more locations.

Despite these facts, Progeny's detractors attempt to argue that Progeny's broadcast-only network design may actually increase tower density. For example, GE tries to make this point by quoting a 2006 filing by Progeny in the now-dormant M-LMS rulemaking proceeding in which Progeny observed that M-LMS transmitters may require a tower range of "slightly less than one quarter of a mile."[44] Of course, this estimate was made in the context of what would be required for a two-way communications networks and not the broadcast-only style M-LMS network under construction by Progeny. Thus, GE's reference from the rulemaking proceeding strongly bolsters Progeny's argument and reinforces the significant concession Progeny has made in restricting itself to one-way broadcast transmissions.

GE also asserts that a broadcast-only style location network could be "woefully inefficient" because it requires "multiple high power transmitters even if only a single user is present." [45] Of course, the inverse is also true – any multilateration network that uses

---

[43] *Id.*, ¶ 77.

[44] *GE Comments* at 8 (quoting *Comments of Progeny LMS, LLC*, WT Docket No. 06-49, at 29 (filed May 30, 2006)).

[45] *Id.* at 6 n.10.

transmissions from mobile units to multiple fixed towers for tracking (the design dictated by Section 90.155 of the Commission's rules) uses spectrum inefficiently whenever the number of mobile units being tracked is greater than the number of towers required for tracking.

As the Commission has explained, highly accurate position location services such as Progeny's are critically needed to help identify the locations of the tens of millions of wireless devices that are increasingly being used by consumers to contact E911 emergency services.[46] Given the massive number of wireless devices that need to be tracked, the only spectrally efficient manner in which this tracking can be accomplished is using a broadcast-only style position location network such as the one that is under construction by Progeny.

This provides further support for a conclusion that Progeny's network design successfully achieves the Commission's goal of minimizing interference and will not cause unacceptable levels of interference to Part 15 devices. Progeny's elimination of mobile transmitters and return path transmissions greatly facilitates spectrum sharing in the 902-928 MHz band by (1) reducing total signal energy in the band, (2) segregating M-LMS transmitters to fixed high-site locations where they will normally be a significant distance from Part 15 receivers, and (3) greatly reducing the required transmitter density for the network.

[46] *See e.g. Progeny Waiver Order*, ¶ 1 ("We seek to facilitate the deployment of a multilateration service that can provide highly accurate location determinations, including more precise location information that can improve delivery of E 911 emergency services."); *Amending the Definition of Interconnected VoIP Service in Section 9.3 of the Commission's Rules, GN Docket No. 11-117, Wireless E911 Location Accuracy Requirements, PS Docket No. 07-114, E911 Requirements for IP-Enabled Service Providers*, Notice of Proposed Rulemaking, Third Report and Order, and Second Further Notice of Proposed Rulemaking, FCC 11-107, ¶ 86 (rel. Jul 13, 2011) ("*E911 Third Report and Order"*) ("[W]e consider indoor location accuracy to be a significant public safety concern that requires development of indoor technical solutions and testing methodologies to verify the effectiveness of such solutions.")

B. Progeny's Limited Transmission Duty Cycle is a Significant and Effective Mitigation Technique

A second highly effective interference mitigation technique that Progeny has incorporated into its M-LMS network is the use of a 10 to 20 percent maximum duty cycle. As RKF acknowledges, the Commission's rules do not require M-LMS licensees to employ a duty cycle, but Progeny has incorporated a significant one in part to help facilitate spectrum sharing with Part 15 devices.[47]

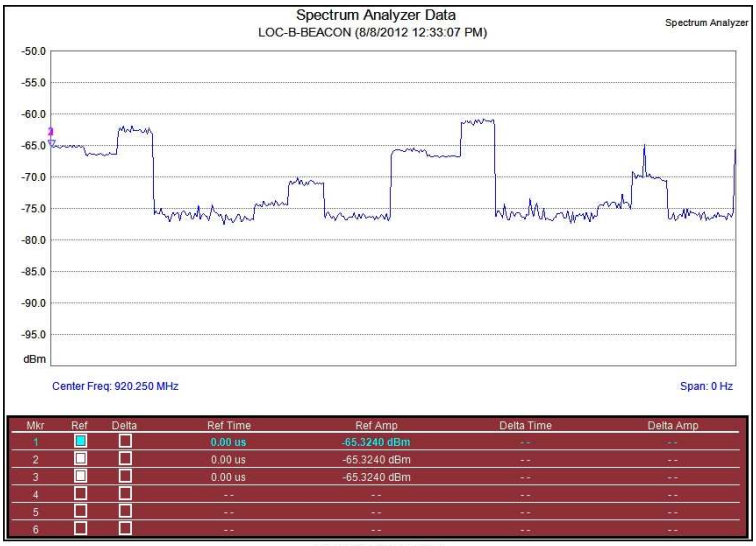
Numerous parties claim that Progeny's duty cycle is largely illusory because Progeny's transmitter beacons operate using different timing slots, meaning that at any moment when nine Progeny transmitter beacons are silent, a tenth beacon may be transmitting at some location. Because of this, the Part 15 parties incorrectly assert that Progeny's network has an effective duty cycle of 80 to 100 percent.[48]

During the various tests that were conducted, the only way to detect the signals of more than just a few M-LMS beacons was to elevate a Part 15 receiver outside on a tall pole into the direct line-of-sight with multiple M-LMS transmitters, which, of course, is what was done by Itron and Landis+Gyr during the joint test process. Importantly, what was detected in this process was not the constant signal of multiple Progeny beacon transmitters, it was a patchwork of beacon pulses at various power levels, some louder, but most below the noise floor. These results were captured during the Landis+Gyr testing in the graph below.

---

[47] *See Analysis of Progeny Part 15 Test Report, RKF Engineering*, WT Docket No. 11-49, at 12-13 (March 15, 2012) ("*RKF Paper*") (included as an attachment to Itron Comments).

[48] *Part 15 Parties Comments* at 4; *Itron Comments* at 5; *WISPA Comments* at 7; Comments of the Utilities Telecom Council, WT Docket No. 11-49, at 5 (filed Dec. 21, 2012) ("*UTC Comments*"); *GE Comments* at 6; *RKF Paper* at 4.



Measurement Parameters

Trace Mode	Average	Start Frequency	920.250 000 MHz
Trace Average	1	Stop Frequency	920.250 000 MHz
Preamp	OFF	Frequency Span	0.000 000 Hz
Min Sweep Time	- -	Reference Level	-50.000 dBm
Reference Level Offset	0.0 dB	Scale	5.0 dB/div
Input Attenuation	0.0 dB	Serial Number	409173
RBW	1.0 MHz	Firmware Version	V5.32
VBW	300.0 kHz	Date	8/8/2012 12:33:07 PM
Detection	Peak	Device Name	S332D
Center Frequency	920.250 000 MHz		

13th and E. Santa Clara Zero Span M-LMS System ON

Thus, even when measured outside on an elevated pole, the duty cycle of Progeny's M-LMS network was evident and effective, creating relative quiet periods when other users of the band could complete transmissions.

Of course, most Part 15 devices are not designed to operate outside on tall poles with direct line-of-sight to multiple interference sources. Instead, most such devices are intended to operate indoors, or outside at or near ground level. Each of the Part 15 tests that were conducted in this manner experienced an effective duty cycle from Progeny's M-LMS network of 10 to 20 percent.[49] This is consistent with the findings of Plantronics, which apparently conducted its own tests of Progeny's fully deployed network in downtown San Jose on December 14, 2012 and was apparently able to detect the signals only from the immediately adjacent Progeny beacons.[50]

[49] *January 2012 Field Test Report* at 3.

[50] *See Plantronics Comments* at 3-4.

Thus, for the vast majority of Part 15 devices and operating conditions, Progeny's network will provide an effective duty cycle of 10 to 20 percent, ensuring substantial opportunity to transmit and receive signals directly co-frequency with Progeny's operations.

Although the Commission's rules do not require M-LMS licensees to employ any duty cycle, Itron speculates that "Itron believes that the Commission's intent was for [M-LMS] systems to use low duty cycle pulse signals."[51] Leaving aside the fact that Progeny's network does employ low duty cycle pulse signals, Itron's only basis for this claim is its assertion that M-LMS was originally intended "to locate vehicles throughout a wide geographic area."[52] In contrast, Itron claims that if Progeny uses its network "for mobile advertising and E911 purposes" that "ultimately will require increasing the duty cycle of each beacon and subsequently the composite duty cycle for all beacons."[53]

Progeny cannot fathom Itron's rationale for this statement. Progeny already has designed its network for E911 position location services and the low duty cycle that it is employing is highly accurate for this purpose. Further, Progeny's chosen duty cycle is not impacted in any way by the use of its location service for different purposes, whether for mobile advertising or public safety. Itron appears to be suggesting that some correlation exists between the number or type of wireless devices being tracked by Progeny's network and the necessary duty cycle and transmitter density of Progeny's network. Such an argument, however, misconstrues the manner in which a broadcast-only style position location network operates and why such networks use spectrum very efficiently. A broadcast-style network can serve ten or ten million customers

[51] *Itron Comments* at 4 n.10.

[52] *See id.* at 4.

[53] *Id.*

using the same broadcast transmissions without any increase in duty cycle, transmitter density, or signal density. Just as millions of television sets can receive the same television broadcast transmissions, millions of wireless devices can be tracked using the same beacon signals. Therefore, Itron is incorrect in suggesting that any expansion in the intended use of Progeny's position location network could necessitate an increase in its duty cycle.

Progeny also questions Itron's underlying theory that the Commission originally intended for M-LMS networks to operate using low duty cycle pulse signals. To the extent that M-LMS licensees were originally intended to track moving vehicles, the use of a low duty cycle may not have been adequate to ensure reliable tracking. A moving vehicle on a highway travels 80 feet per second when complying with a 55 mph speed limit. It is unclear whether an M-LMS network using a duty cycle repetition of only one second would always be adequate to reliably track such a vehicle. Therefore, no basis exists for Itron's suggestion that the Commission intended for M-LMS networks to operate with a duty cycle that is any lower than what is already employed by Progeny's network. The Commission should therefore recognize that Progeny's use of a 10 to 20 percent duty cycle is an efficient and effective mitigation technique that heightens the opportunities for Part 15 devices to operate directly co-frequency with Progeny's network, while ensuring accurate and reliable tracking of wireless devices.

C. Progeny's use of a Maximum Fixed Transmitter Power of 30 Watts ERP also Further Mitigates Interference in the 902-928 MHz Band

Itron claims that Progeny's position location service was "not designed . . . to reduce the amount of interference potential to unlicensed users."[54] In seeking to prove this point, Itron states that Progeny's M-LMS network will operate using "30 W ERP signals from the

[54] *See id.*

beacons."[55] The Commission's rules, however, not only permit M-LMS licensees to operate *fixed* stations at 30 Watts ERP, the rules also permit M-LMS licensees to operate *mobile* transmitters at 30 Watts ERP as well,[56] providing even further evidence that Progeny's decision to forgo the use of mobile transmitters and return transmission links substantially benefits spectrum sharing with co-frequency Part 15 devices.

Further, Progeny's M-LMS licenses also authorize it to operate both fixed and mobile units at up to 300 Watts ERP in the 927.25-927.75 MHz portion of its licensed spectrum, which Progeny has refrained from doing.[57] Cognizant of this fact, WISPA argues that if the Commission approves Progeny's commercial operations, "nothing would prevent Progeny . . . from increasing its transmit power from 30 Watts to the 300 Watt limit in the upper part of the band.[58] In fact, Progeny acknowledged and specified in its January 2012 Field Test Report that the spectrum sharing tests that it completed with Part 15 devices do not apply to operations at 300 Watts.[59] Therefore, Progeny would need to conduct addition testing with Part 15 devices before operations at 300 Watts could be initiated.

---

[55] *Id.* at 4.

[56] *M-LMS Order*, ¶ 93.

[57] *Id.*

[58] *See WISPA Comments* at 11 (citing 47 C.F.R. § 90.205(i)).

[59] *See January 2012 Field Test Report* at 9 n.4.

III. GIVEN THE EFFICACY OF PROGENY'S MITIGATION TECHNIQUES, COMMISSION AUTHORIZATION TO BEGIN COMMERCIAL SERVICE WOULD CREATE A BENEFICIAL PRECEDENT

As the Commission has recognized, Progeny's M-LMS network design "takes the goal of minimizing interference to other users into account"[60] by incorporating significant and effective interference mitigation techniques. These measures enhance exponentially the spectrum sharing capabilities of Progeny's network as compared to the M-LMS network design that is specified in the Commission's rules. The Commission's grant of approval for Progeny to initiate commercial operations would therefore result in a substantial beneficial precedent with respect to the possible designs of M-LMS networks by other licensees.

A number of Progeny's opponents assert the opposite claim, suggesting that the initiation of Progeny's commercial service would result in an undesirable precedent for other M-LMS licensees.[61] These parties further argue that, if Progeny's service is authorized, other M-LMS licensees could secure authority to construct "copy-cat" networks that could "render unusable the remainder of the band for unlicensed users."[62]

Such arguments are a red herring for several reasons. First, it is obvious that Part 15 devices operating in other portions of the 902-928 MHz band would be much better off if other M-LMS licensees designed their networks to mirror that of Progeny, rather than use the outdated and spectrally inefficient specifications that exist in Part 90 of the rules.

---

[60] *Progeny Waiver Order*, ¶¶ 18, 26 (granting conditional waivers of Sections 90.155(e) and 90.353(g) of the Commission's rules).

[61] *Part 15 Parties Comments* at 7; *UTC Comments* at 4-5; *Comments of New America Foundation and Public Knowledge*, WT Docket No. 11-49, at 2 (filed Dec. 21, 2012) ("*PK/NAF Comments*").

[62] *Part 15 Parties Comments* at 7.

Second, M-LMS is not authorized across the entire 902-928 MHz band, just 14 MHz of it and Progeny's B and C block licenses cover more than half the M-LMS spectrum in those markets in which Progeny holds licenses.[63] The remaining 6 MHz of A block M-LMS spectrum is primarily controlled by Warren Havens,[64] who has shown no interest in constructing a Progeny-style network, or capability to build anything else for that matter.[65] The other four M-LMS licensees primarily hold B and C block licenses in those often rural markets where Progeny does not hold licenses.[66] If any of them sought to construct a Progeny-style network, which does not seem likely, it would not increase the amount of spectrum that is used for such position location services so much as it would increase its geographic reach. In any event, the initial construction milestone deadline for all of the M-LMS licensees passed in July 2012 and the Commission is deliberating on their disposition.[67]

No reason therefore exists for the Commission to refrain from authorizing Progeny to begin providing commercial position location service. Given the significant and highly effective

---

[63] See *FCC Location & Monitoring Service Auction*, Round Results, High Bids, Auction ID: 21, Attachment A (rel. March 8, 1999) (available at http://wireless.fcc.gov/auctions/21/releases/d990405a.pdf) ("*Auction 21 Results*").

[64] *Id.*

[65] *See e.g. Warren C. Havens, Skybridge Spectrum Foundation, Verde Systems, LLC and its predecessor in interest, Telesaurus VPC, LLC Applications for Waiver and/or Extension of the Five and Ten Year Construction Deadlines Applications for Renewal of 220 MHz Licenses,* Order, DA 12-848 ¶¶, 17-20 (rel. May 31, 2012) (Denying requests for extension of construction deadlines and terminating licenses because the Havens had "voluntarily chosen not to construct facilities within their license areas, nor ha[d] they provided concrete near term plans to provide actual service in those areas.")

[66] *Auction 21 Results.*

[67] *See Wireless Telecommunications Bureau Seeks Comment on Request by Progeny LMS, LLC, FCR, Inc., Helen Wong-Armijo, and PCS Partners, L.P. for Waiver and Extension of Time to Construct 900 MHz Multilateration Location and Monitoring Service Licenses, WT Docket No. 12-202*, Public Notice, DA 12-1144 (rel. Jul. 17, 2012).

interference mitigation measures that Progeny has employed, along with the substantial public interest need for Progeny's position location service, the Commission's authorization for Progeny to begin its commercial operations would serve as a beneficial and desirable precedent for other licensees.

IV. THE JOINT TEST RESULTS DEMONSTRATE THAT UNACCEPTABLE INTERFERENCE WILL NOT RESULT TO THE PART 15 DEVICES THAT WERE TESTED

On January 27, 2012, Progeny filed with the Commission a report on field tests performed by Spectrum Management Consulting, Inc., a respected and independent RF engineering firm, that demonstrate that Progeny's M-LMS network will not cause unacceptable levels of interference to Part 15 devices in the 902-928 MHz band.[68] To support these tests, Progeny engaged in exhaustive efforts to identify a representative sample of Part 15 devices that comprise an accurate cross section of the types of devices, technologies and modulation techniques employed in the 902-928 MHz band, including devices designed for automatic meter reading ("AMR"), fixed wireless broadband ("FWB"), RFID, wireless phones, emergency pendants, wireless speakers, and baby monitors.[69] Ultimately, the testing that was conducted focused on 17 unlicensed devices, selected to represent a wide range of unlicensed uses and also selected because of their use of spectrum that was co-frequency with Progeny's licensed service.

The Commission placed Progeny's test report on public notice and interested parties filed comments, including three parties that argued that additional testing was needed on two types of

[68] *See January 2012 Field Test Report.*

[69] *Id*. at 15-17.

Part 15 devices – AMR and FWB equipment.[70] At the urging of the Commission, Progeny agreed in May 2012 to additional testing involving three parties, Itron, Landis+Gyr and WISPA using a joint test plan that, the Commission staff had been told, was largely complete. In fact, no test plan had been developed and Progeny therefore spent much of May through July working with the three parties to develop the test plan. Once developed, the actual testing was intermittently conducted beginning in late July and extending into late September because of scheduling difficulties for one of the three parties. The joint test process resulted in the preparation of three joint test reports (a separate one for each of the three parties to protect their proprietary information), which were filed with the Commission on October 31, 2012.[71]

Itron, which conducted its joint testing with Progeny in late July, announced on September 5, 2012 that it wanted to conduct a second round of testing later in the fall. Progeny agreed to such additional joint testing, but indicated that it could not continue to conduct on/off testing of its San Francisco Bay Area network beyond October 8, 2012 in order to prepare for the indoor location accuracy tests for E911 that were being conducted by Working Group 3 of the Commission's Communications Security, Reliability and Interoperability Council ("CSRIC"). Rather than work within this scheduling restriction, Itron apparently conducted its own unilateral testing with Progeny's network always on during the October 16-19, 2012 timeframe.[72] In

[70] *The Wireless Telecommunications Bureau and the Office of Engineering and Technology Seek Comment on Progeny's M-LMS Field Testing Report*, Public Notice, 27 FCC Rcd 1579 (WTB/OET 2012).

[71] See *Joint Part 15 Test Reports.*

[72] *See Itron Unilateral Testing.*

addition, Plantronics apparently conducted further unilateral testing using Part 15 equipment that it manufactures in downtown San Jose on December 14, 2012.[73]

All told, Progeny has been involved in extensive testing of its M-LMS network for more than a year. Progeny provided extensive analysis of its January 2012 Field Test Report in comments that it filed with the Commission on March 30, 2012.[74] Progeny therefore addresses herein the findings of the three joint test reports that were filed on October 31, 2012; the results of the unilateral testing that was apparently conducted by Itron in October 2012 and filed with the Commission on December 17, 2012; and the unilateral testing that was apparently conducted by Plantronics on December 14, 2012 and filed with the Commission on December 20, 2012. Considered together, the six different test reports provide a consistent and persuasive demonstration that Progeny's position location network will not cause unacceptable levels of interference to Part 15 devices operating in the 902-928 MHz band.

A. The Joint Test Reports Addressing Part 15 AMR Devices Demonstrate that Progeny's M-LMS Network will not Cause Unacceptable Levels of Interference to AMR Networks

Progeny's tests of its M-LMS network with AMR devices clearly demonstrate that Progeny's position location service can operate compatibly with AMR networks. The joint tests with Landis+Gyr and Itron support this conclusion. For example, in the tests of Landis+Gyr AMR equipment that operate using Progeny's licensed spectrum, the Landis+Gyr AMR devices

[73] *See Plantronics Comments.*

[74] *See* Response of Progeny, LMS LLC, The Wireless Telecommunications Bureau and the Office of Engineering and Technology Seek Comment on Progeny's M-LMS Field Testing Report, WT Docket No. 11-49 (filed Mar. 30, 2012) ("*Progeny January 2012 Testing Comments*").

experienced an average reduction in data throughput of less than one percent (0.12 percent) when the Progeny network was turned on.[75]

In commenting on this result, Landis+Gyr states "in L+G's view, the tests demonstrate that operation of the Progeny beacons in the prototype Santa Clara County system degraded the packet throughput of the L+G Part 15 equipment in several test configurations."[76] Any degradation that was attributable to Progeny's M-LMS network, however, was exceedingly small and was only a fraction (often a small fraction) of the overall degradation that the tested AMR devices experienced from other sources in the 902-928 MHz band. Further, the presence of Progeny's beacon transmissions did not disrupt the data links of the tested devices or prevent the desired transmissions from being sent and received as intended.

For example, in the tests of the Itron AMR devices, the average data throughput success rate of Itron's equipment with Progeny's network *turned off* was 59.9 percent.[77] Once Progeny's network was turned on, the average throughput success rate dropped by 8.1 percent, to 51.8 percent. This trend was depicted in detail in a graph presented previously at page 15 of this response.

Landis+Gyr attempts to counter the joint test results by arguing that they "may not represent the impact of a more mature, densely populated Progeny network operating in an environment in which L+G devices are also more densely populated."[78] In reality, the Progeny network that was used for testing in Santa Clara County was a fully mature Progeny network

[75] *Progeny & Landis+Gyr Joint Testing* at 10, Table 3.

[76] *Landis+Gyr Comments* at 2-3.

[77] *October 31 Letter* at 2-3.

[78] *Id.* at 3.

with density levels comparable to any other community with a similar mix of urban and suburban neighborhoods.

With respect to the density of the Landis+Gyr equipment, Progeny acknowledges that the joint testing employed only a few AMR transmitters and receivers spaced apart near the effective edge of their operating distances. In a dense population of Landis+Gyr devices, however, most of its end user AMR transmitters will statistically be likely to be much closer to an AMR receiver, or perhaps multiple AMR receivers, greatly increasing the average throughput success rate of data transmissions. Progeny therefore believes that the actual results involving a fully deployed AMR network will show even less of an impact from Progeny's M-LMS network.

Itron also challenges the results of the joint testing arguing that a major reason why its AMR equipment was able to function successfully in the presence of Progeny's M-LMS network was because of the interference mitigation techniques that Itron employs in its AMR equipment.[79] The AMR devices that Itron used in the tests employ frequency hopping technology to continually shift throughout the band.[80] Itron also explains that some of its AMR equipment ensures reliable throughput by "simply transmitting at certain intervals to obtain messages."[81] Itron apparently claims that if its interference mitigation measures were disabled, Progeny's service would excessively degrade Itron's transmissions.

Progeny believes that Itron's position is both incorrect and unreasonable. Turning to the latter point first, Itron routinely places its Part 15 receivers outside on tall 25 to 50 foot poles often xxxxxxxxxxxxx from the desired Part 15 transmitters and in direct line of sight to multiple

[79] *See Itron Comments* at 7.

[80] *See id.* at 2.

[81] *See id.*

interference sources. The only way in which Itron's AMR equipment can operate successfully today in such configurations is by using interference mitigation measures such as frequency hopping and retransmitting information at regular intervals. Itron, however, argues unreasonably that Progeny should not be permitted to consider these same interference mitigation measures in demonstrating that its position location network will not cause unacceptable interference to Itron's AMR networks.

Second, Itron's argument is incorrect. Itron has argued repeatedly that Progeny's network will prevent its frequency hopping equipment from successfully transmitting any data on the specific 4 MHz of 902-928 MHz spectrum employed by Progeny's location beacons.[82] Itron further argues that its AMR devices will instead be forced to shift more data transmissions to the lower portion of the band (increasing congestion in that portion of the band) and retransmit data more frequently (draining battery life).[83]

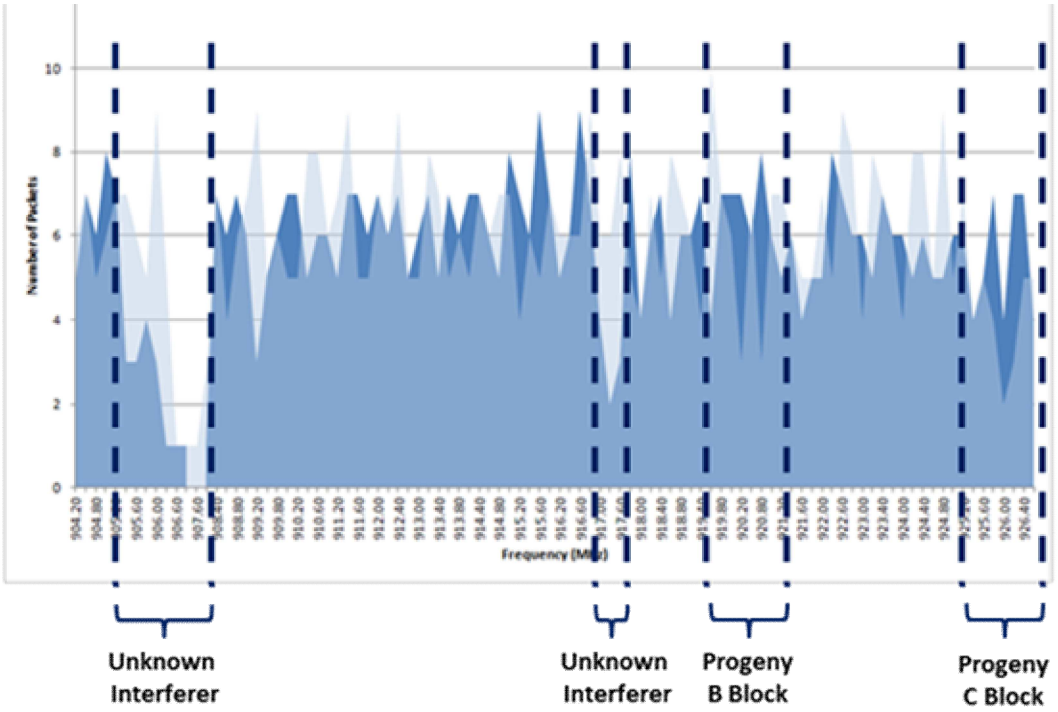
Itron is incorrect with respect to each of these assertions. The joint test process included many configurations in which Itron's AMR equipment successfully transmitted data on channels that were directly co-frequency with Progeny's beacons. These results are depicted in some of the figures that Itron prepared for the joint test report.[84] Some examples are provided below. The dark blue areas in the figures below illustrate Itron's throughput success rate on each frequency channel with Progeny's network turned off and the light blue illustrates Itron's throughput success rate on each frequency channel with Progeny's network turned on. As is evident, Itron's AMR devices continued to transmit and receive data on channels that were

[82] *Itron Comments* at 3; *Itron Unilateral Testing* at 8.

[83] *Itron Comments* at 3; *RKF Paper* at 8.

[84] *Progeny & Itron Joint Testing* at 25.

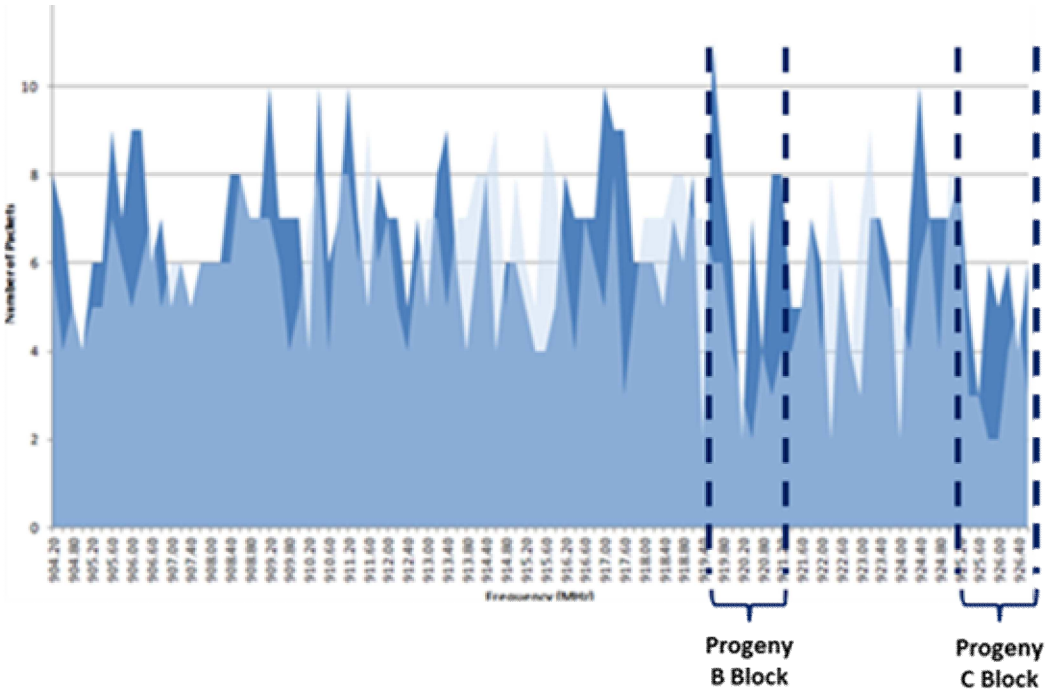
directly co-frequency with Progeny's M-LMS beacons. (Further, as is also evident in the figure below, Itron's AMR equipment withstood the effects of Progeny's M-LMS beacon signals much better than it withstood the effects of other unidentified interference sources operating around 906 and 917 MHz.)



Itron Test 16 and Test 20 (25 ft. Antenna Ht.)
Location 2: Suburban (no close proximity and no colocation)

The test above depicts sharing between Itron's AMR network and Progeny's service in normal suburban operating conditions with three M-LMS beacons surrounding the site at distances of xxxxxxxxxxxxxxxxxxxxx. The test results in the figure below depict sharing between Itron's AMR network and Progeny's service in a far more dense environment with three M-LMS beacons surrounding the site at distances of just xxxxxxxxxxxxxxxxxxxxx.[85] Even in this far more dense environment, Itron's AMR network was were still able to transmit data in the frequency segments that were directly co-frequency with Progeny's position location service.

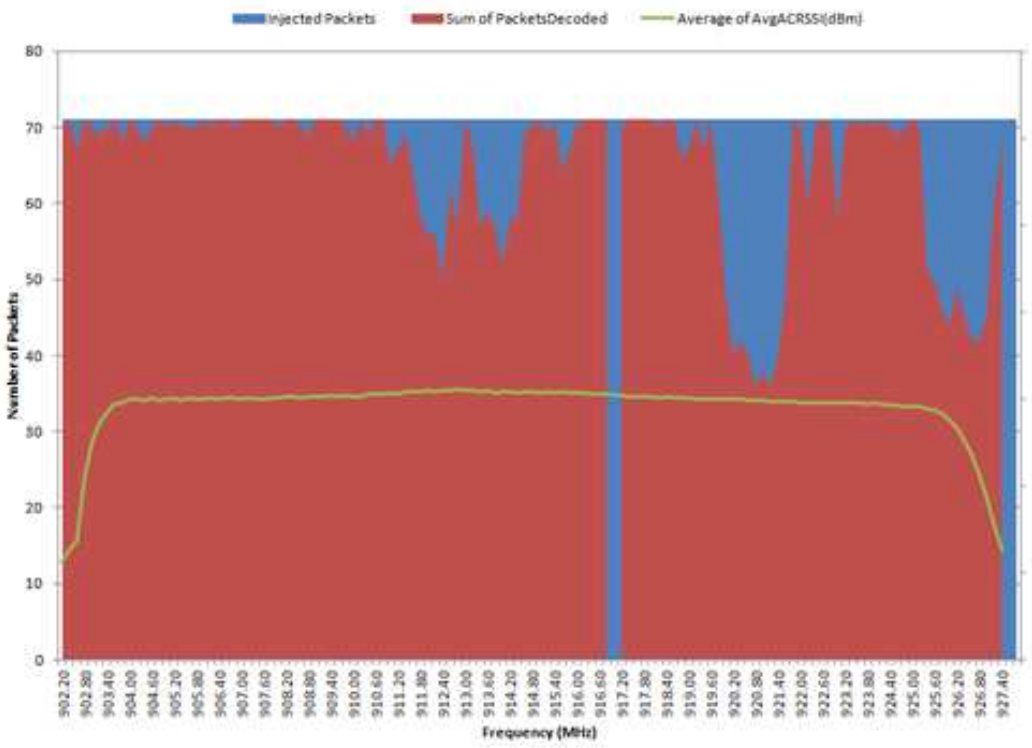
[85] *Id*. at 17.



Itron Test 34 and Test 38 (50 ft. Antenna Ht.)
Location 1: Suburban (close proximity but no colocation)

Finally, tests were conducted in break case conditions with Itron equipment co-located with a Progeny transmitter.[86] In this configuration, Itron's PER tests did reveal increased difficulty in transmitting data on channels that were directly co-frequency with a co-located Progeny beacon, but AMR data was successfully transmitted. The tests also showed that Itron's AMR equipment will have no difficulty even in the co-located break case test conditions using its frequency hopping and retransmitting capabilities to successfully transfer data on other channels and time slots.

[86] *Id.* at 30.



Itron Test 25 (11 ft. Antenna Ht.)
Location 3: Urban (colocation and close proximity)

Itron argues that forcing its AMR devices to transfer data on other channels in worst case conditions will increase congestion in the lower portion of the band.[87] This argument, however, misrepresents the manner in which frequency hopping devices work. They are not intelligent devices, hopping more frequently on the quieter channels. Instead, they rely on fixed patterns, always hopping across each channel without consideration of which channels work best in a given situation.[88] Thus, the existence of Progeny's service in the upper end of the band will not push Itron's frequency hopping devices into the lower portion.

[87] *Itron Unilateral Testing* at 8.

[88] K. H. Torvmark, Frequency Hopping Systems at 3, Texas Instruments (available at http://www.ti.com/lit/an/swra077/swra077.pdf).

Itron further argues that forcing its AMR devices to retransmit data expends additional energy and potentially drains battery life.[89] Here again, Itron is assuming that its AMR devices are intelligent, retransmitting only the data that was not successfully received in previous transmissions. In reality, a review of the equipment certifications for the devices that Itron employed in the tests shows that Itron's AMR networks operate in a one-way manner, with data transmissions originating at end user transmitters and received by master receivers and, in some cases, master repeaters. The end user transmitters do not receive verification signals from the transmitters regarding whether previous transmissions were successful and, therefore, any retransmission of data must be automatic and not tied to a determination regarding whether the retransmitted data was successfully received in a previous transmission. Therefore, any data losses attributable to various noise sources in the 902-928 MHz band do not affect the battery life of Itron's AMR devices.

Finally, Itron appears to raise concern about the possibility that Progeny's beacon transmitters might be co-located on towers with Itron receivers, arguing that "wherever Progeny has collocated high powered beacons, collocated endpoints will need mitigation."[90] Itron raised this same argument in March 2012[91] in response to the Commission's public notice seeking comment on Progeny's January 2012 Field Test Report and Progeny assured the Commission that if Progeny seeks to place an M-LMS transmitter on the same tower with an existing Part 15

[89] *See Itron Comments* at 7.

[90] *Id.* at 6.

[91] *See* Comments of Itron, Inc. on Progeny Test Report, WT Docket No. 11-49, at 10-11 (March 15, 2012); *RKF Paper* at 5 and 7-8.

receiver, it will make arrangements with the operator of the Part 15 receiver to ensure that no harmful interference results.[92] Progeny continues to maintain this position.

Given these facts and the comprehensive results of the joint test process, the Commission must conclude that Progeny's critically-need position location service will not cause unacceptable levels of interference to AMR networks operating in the 902-928 MHz band.

B. Itron's October 2012 PER Test Results Are Insufficiently Disclosed, Misleading and, in any event, do not Suggest that Progeny's M-LMS Network Will Cause Unacceptable Levels of Interference to Part 15 Devices

As noted above, when Itron announced on September 5, 2012 that it wanted to conduct a second round of testing, Progeny agreed to participate in such testing as long as it was completed before October 8, 2012 when Progeny needed to suspend on/off testing in order to prepare for the CSRIC Working Group 3 indoor location accuracy tests for E911. Rather than work within this constraint, Itron chose to conduct additional frequency monitoring unilaterally.

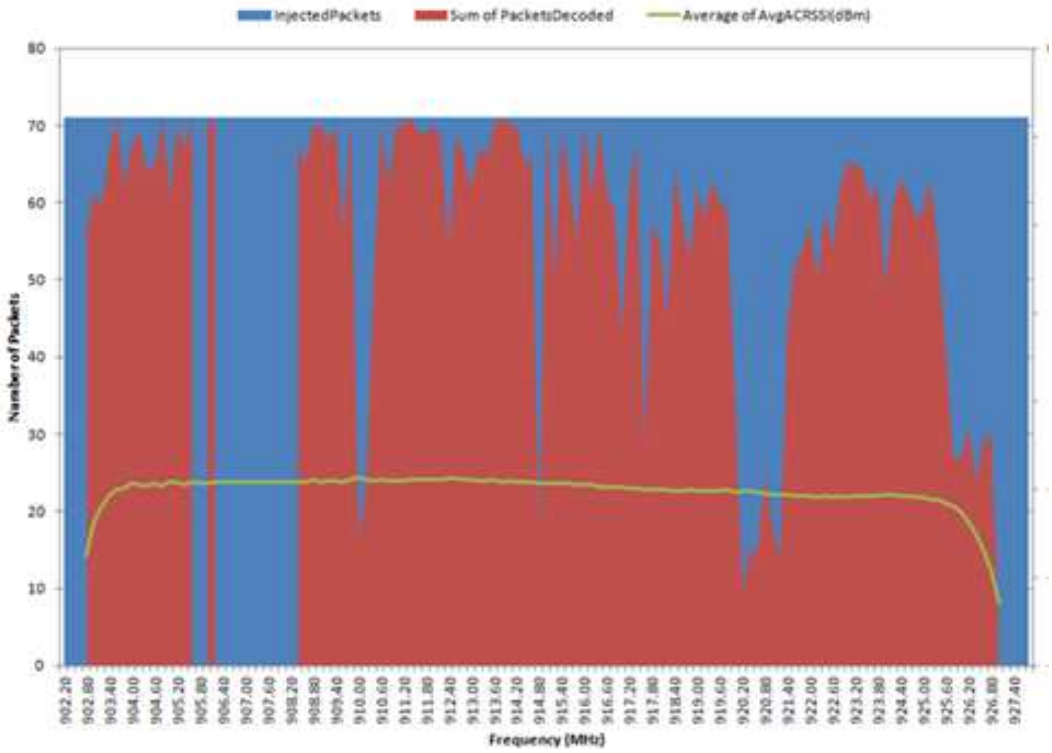
The results of Itron's unilateral frequency monitoring are far from transparent. Itron's report reveals 39 test locations, but Itron claims that only 17 sites were tested and Itron reveals data for only 12 test sites, leaving the reader to wonder about the test results for the remaining 27 test locations.[93]

Itron also fails to disclose the injected signal strengths that were used in its PER tests. Based on Progeny's July testing with Itron, it is possible that Itron would prefer not to reveal that it used injected signal strengths below the noise floor and possibly as low as xxxx dBm in order to try to claim that Progeny's M-LMS service will preclude transmissions by Itron devices in the

[92] *See Progeny January 2012 Testing Comments* at 28-29.

[93] *Compare Itron Unilateral Testing* at 3 (claiming 17 test sites); *id*. at 5 (map with 12 marked locations, numbered discontinuously from 1 to 39).

specific 4 MHz where Progeny's location service operates. During the July tests, Itron insisted on conducting PER tests with injected signal strengths as low as xxxx and xxxx dBm. The results of some of these tests were highlighted in the joint test report that was filed on October 31, 2012.[94] As detailed in the figure below, the tests using injected signal strengths of xxxx dBm and below revealed that, at such low power levels, although Progeny's transmissions had an impact on co-frequency data throughput rates, numerous other noise sources in the 902-928 MHz band also had a significant impact on the data throughput success rates, particularly around 906-908 MHz where the data throughput success rate dropped to zero.



Test 20 RF/PER Test xxxx (dBm)
Location 2: Suburban (no close proximity and no colocation)

Itron's PER test results also appear to delete some of the most potentially relevant results, disclosing the results from eleven injected signal strengths for most of the PER tests, but

[94] *Progeny & Itron Joint Testing* at 28.

revealing the results for only nine signal strengths in several locations (*See* Locations 21, 23 and 39)[95] and only eight signal strengths in one location (*See* Location 16).[96] Progeny suspects that Itron declined to show test results at power levels that showed significant data throughput in the presence of Progeny's M-LMS signal. These results are likely the most relevant since, based on Progeny's previous experience in tests with Itron, they were probably completed using injected signal strengths of around xxxx to xxxx dBm, which are far more reasonable power levels to consider when designing Part 15 equipment to operate successfully in the already noisy 902-928 MHz band.

Itron claims that its unilateral tests reveal that transmissions from Progeny's network may reach well beyond Progeny's intended service area.[97] In reality, as Itron is well aware, Progeny had launched additional M-LMS networks in San Francisco and the East Bay in preparation for the CSRIC tests and Itron likely detected those new beacons, particularly when Itron was conducting tests outside the initial South Bay test area in such relatively northern locations as Hayward, Union City, Pleasanton, and Livermore.[98]

Finally, Itron claims that Progeny changed its M-LMS network in the South Bay following the completion of the July tests, claiming that it detected beacon signal in all ten of Progeny's time slots in October, but only eight slots in July.[99] In reality, Progeny has always used all ten time slots in its South Bay network. Although Progeny did add three additional M-

[95] *Itron Unilateral Testing* at 38, 41, 47.

[96] *Id*. at 29.

[97] *Itron Comments* at 6.

[98] *Itron Unilateral Testing* at 38.

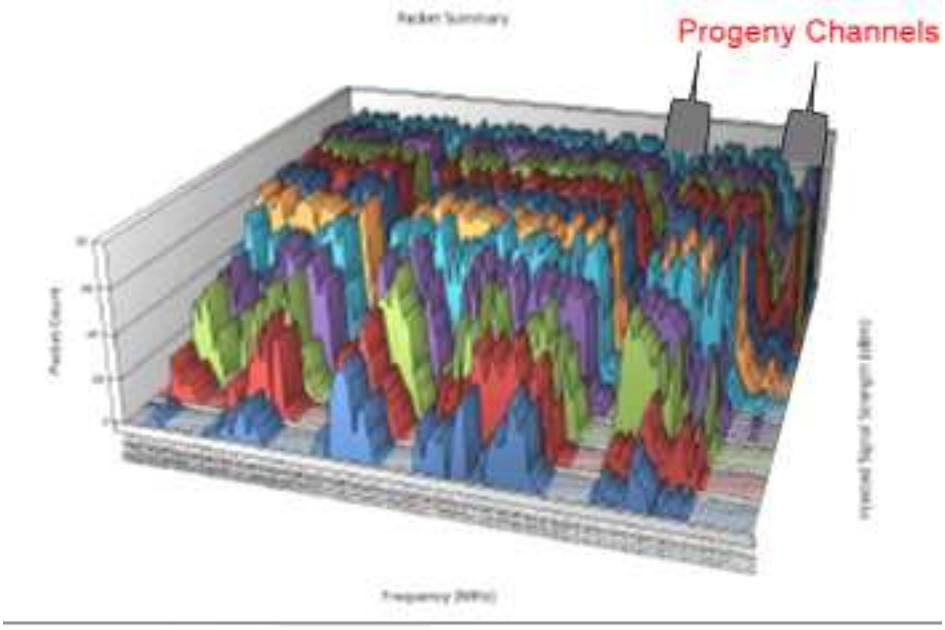
[99] *Itron Comments* at 5.

LMS transmitters in the South Bay (increasing the South Bay transmitter count from 22 to 25 transmitters), the additional transmitters did not employ additional time slots and did not alter the interference environment in the test area.

In any event, Itron's PER tests are purely theoretical and do not reveal anything about the functioning of actual Part 15 devices in the presence of Progeny's position location service. As noted previously herein, Itron's PER tests are based on a channel occupancy of 200 kHz even though Part 15 devices that are designed with sufficient operating power to achieve high data rate and/or long range communications are required under Section 15.247 of the Commission's rules to employ digital modulation, which is defined as a minimum of 500 kHz 6 dB carrier bandwidth. Therefore, no manufacture could market a Part 15 devise that is designed to span significant distances in outdoor environments using a single channel 200 kHz carrier transmission and it is therefore irrelevant whether such a single channel 200 kHz device could operate successfully in the presence of Progeny's M-LMS transmitters.

Further, although Itron's PER tests appear to show that Progeny's beacon signals can reduce the throughput of Itron's co-frequency transmissions when Itron's transmissions are at very lower power levels, the tests also show that, at these same low power levels, other noise sources in the 902-928 MHz band also block Itron's transmissions, such as the noise source that appears to exist in the figure below around 908 MHz.[100]

[100] *Itron Unilateral Testing* at 26.



Itron Location 8 with Receiver on a 25 Foot Tower

Given these facts, Itron's PER tests do nothing to further Itron's claim that Progeny's M-LMS service will cause unacceptable levels of interference to Itron's AMR networks. Itron's AMR networks will still be able to operate reliably and efficiently across the entire 902-928 MHz band using the same interference mitigation techniques to address worst case conditions as Itron's equipment currently uses to withstand interference from other sources of noise in the 902-928 MHz band.

C. Progeny's Position Location Service will have no Difficulty Avoiding Unacceptable Levels of Interference to FWB Networks

FWB networks use by far the most intolerant devices that Progeny tested with respect to their ability to withstand interference from other noise sources in the 902-928 MHz band. This was evident in the joint test process long before the actual testing began. WISPA required in the joint test plan that FWB networks not be tested within "600 meters (2000 feet) from the nearest 800 MHz cellular transmitter, 929-930 MHz paging transmitter or non-participating 900 MHz

WISP installation" because of the harmful interference that would result to the tested FWB device.[101]

Despite these significant limitations in the operating capabilities of FWB equipment, the co-channel tests of Progeny's network with the leading types of FWB equipment revealed average data throughput degradation of only 24.4 percent. The amount of this throughput reduction varied substantially (from a low of 2.5 percent to a high of 49 percent) depending on the physical placement of the FWB receiver, the directionality of the BWA antenna, and the exact center frequency employed by the FWB device.[102]

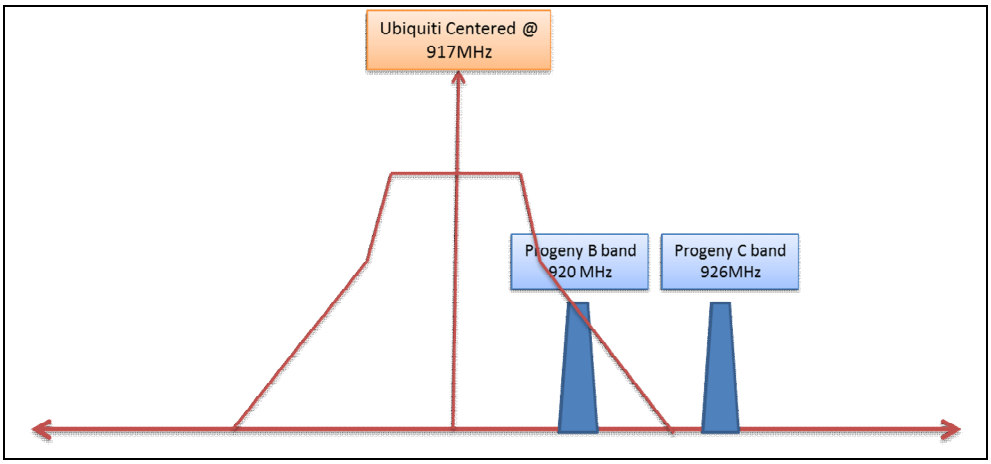
In fact, one of the most significant findings of the joint tests with FWB equipment is that minor adjustments to the configuration of an FWB network can have a tremendous impact on its ability to withstand interference from other noises sources, including the presence of Progeny's network. For example, in tests with the Ubiquiti FWB equipment, an FWB link that was set to operate with a center frequency of 917 MHz (which, as shown in the figure below,[103] overlapped partially with Progeny's B block signal) recording a throughput reduction of 47.9 percent.[104]

[101] This restriction is reflected in the Progeny & WISPA Joint Test Report. *See Progeny & WISPA Joint Testing* at 3.

[102] *See id.* at 16-21.

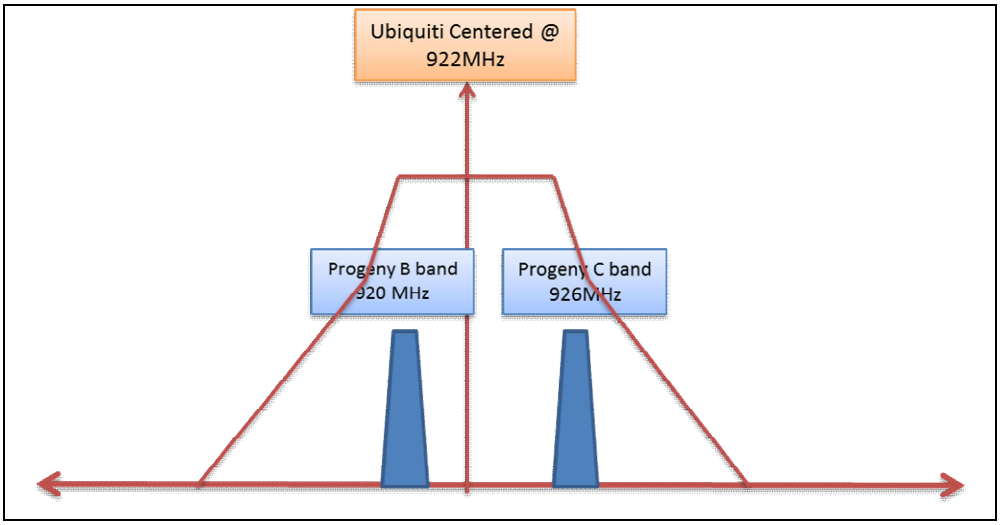
[103] This Figure is included in the Progeny & WISPA Joint Test Report. *See id.* at 12.

[104] *Id.* at 20 (Fig. 16).



Joint FWB Test with Ubiquiti Equipment Centered at 917 MHz

In a slightly different test configuration, with the FWB equipment adjusted to operate with a center frequency of 922 MHz (which, as shown in the figure below,[105] overlaps with both Progeny's B and C block signals), the reduction in the throughput rate dropped significantly to just 2.5 percent.[106]



Joint FWB Test with Ubiquiti Equipment Centered at 922 MHz

[105] This Figure is included in the Progeny & WISPA Joint Test Report. *See id. at 13.*

[106] *Id.* at 21 (Fig. 17).

The test results therefore indicate that spectrum sharing between FWB networks and Progeny's service can be accomplished using relatively minor adjustments to operating conditions and, directly contrary to WISPA's claim, such changes do not necessarily involve moving the FWB link out of the spectrum used by Progeny. Instead, in the example above, the throughput reduction was all but eliminated by moving the FWB link to actually further overlap the Progeny signals.

WISPA does not dispute the joint test results, but instead creatively argues that the joint tests reveal an "aggregate" percentage reduction in throughput of as much as 62.2 percent.[107] As noted previously, WISPA created this fictitious statistic by combining data loss percentages in the inbound and outbound direction of an FWB network, effectively aggregating the numerator while failing to double the denominator, resulting in an invalid percentage based on an impossible total transfer rate of 200 percent. As explained above, the test results showed that data throughput reductions never exceeded 49 percent, they averaged around 24 percent, and they could be reduced substantially further using minor changes in operating characteristics.

In any event, the results of the joint tests between Progeny and WISPA are arguably irrelevant because they involved very worst case conditions that are unlikely to exist in real life. In this regard, WISPA claims in its comments that WISPs "operate successfully on the 902-928 MHz band every day, *all over the country* in spite of sometimes-high noise levels."[108] In reality, WISPA members have explained in numerous letters that were filed in this proceeding that they use 900 MHz FWB equipment only in very rural environments with non-line-of-sight

[107] *See WISPA Comments* at 5-6.

[108] *See id.* at 8 (*emphasis added*)

conditions.[109] WISP operators explain that 900 MHz WISP equipment is exceedingly intolerant and even a baby monitor "will blow up" an FWB connection "to any customer within the nearby area."[110]

Given the extremely limited use of 900 MHz FWB equipment by WISP operators, Progeny believes that spectrum sharing with such services can be accomplished without difficulty. The primary public interest need for Progeny's service is in urban and suburban areas where indoor location accuracy has become a significant challenge for emergency first responders. Progeny is constructing its network initially in these markets. Although Progeny may also deploy its service in rural areas, in such environments, Progeny's service is much more likely to act as a supplement to GPS, possibly employing a few beacon transmitters to augment the location information already provided by the GPS network.

Given these facts, Progeny is willing to assure the Commission and WISP operators that it will work closely with WISP service providers in any rural community in which it eventually seeks to operate in order to ensure that any interference that results to 900 MHz FWB networks

[109] *See e.g. Joink Comments* at 1 (explaining that they have "improved our fixed wireless network to reduce the number of customers we service using 900 MHz spectrum, however, there are still 350 customers who [due to the low population density, terrain and trees] cannot be serviced reliably from another spectrum."); *NetsurfUSA Comments* at 1 ("We always try to serve client by 2.4 [GHz] and only provide 900 MHz if there is no other way to provide broadband."); Comments of InvisiMax, Inc., WT Docket 11-49, at 1 (filed Dec. 21, 2012) ("Today we only use 900 MHz in two locations."); Comments of Sky Valley Network, WT Docket 11-49, at 1 (filed Dec. 21, 2012) (explaining that approximately "10% of our customers receive their internet connection via 900 MHz unlicensed equipment"); *Fourway Comments* at 1 (explaining that 900 MHz is a "last resort" for customers with "terrain or obstruction issues"); Comments of Tincans Wireless Internet, WT Docket 11-49, at 1 (filed Dec. 21, 2012) (The difficulty with 900 MHz is it is "often difficult to avoid self-interference and even more difficult to avoid harmful interference from other sources, including other ISP's, water/electric meters, phones, baby monitors, illuminated signage, the list goes on and on.").

[110] *See Q-Wireless Letter* at 1 (further noting that interference to 900 MHz FWB also results from "invisible dog fences, water tanks SCADA systems and farmers' GPS equipment").

is minimized and does not preclude the continued provision of wireless broadband services to these customers.

V. THE COMBINED TEST RESULTS DEMONSTRATE THAT PROGENY'S LOCATION SERVICE WILL NOT CAUSE UNACCEPTABLE LEVELS OF INTERFERENCE TO ALL FORMS OF PART 15 DEVICES

Apparently recognizing that the extensive testing that has been conducted demonstrates that Progeny's M-LMS network will not cause unacceptable levels of interference to the Part 15 devices that have been tested, the Part 15 parties express a need to conduct still more tests with Part 15 equipment that, they claim, may be even more susceptible to interference.[111] As the Commission is aware, Progeny has already conducted testing with a wide variety of equipment, including multiple rounds of testing with AMR and FWB devices, both of which operate in conditions (elevated outdoors) that make them highly susceptible to interference.

The Part 15 parties and UTC also raise concern about Part 15 devices that cannot hop, or spread their signal, or change channels, expressing specific concern regarding devices that use DSSS technology.[112] Progeny, however, did include single channel and DSSS technology Part 15 devices in its 2011 tests of Part 15 equipment and the results clearly showed that Progeny's service did not disrupt their operations.[113] Further, some of the Landis+Gyr equipment that was tested with Progeny's service employed DSSS technology, although none of it operates directly co-frequency with Progeny's service.[114] Finally, the Part 15 parties expressed the need to

[111] *Part 15 Parties Comments* at 5 and 7.

[112] *See id.* at 6; *UTC Comments* at 4

[113] *January 2012 Field Test Report* at 18.

[114] *Progeny & Landis+Gyr Joint Testing* at 7-9.

conduct tests with Part 15 RFID devices.[115] Two types of RFID devices were included in Progeny's 2011 Part 15 tests and neither device evidenced any reduction in effective link distance or performance in the presence of Progeny's M-LMS service.[116]

Progeny has tested Part 15 devices in numerous configurations, indoors and outdoors, both elevated and at ground level, and with direct line of sight to multiple M-LMS beacon transmitters.[117] One party called for even more testing of Part 15 devices in indoor settings, claiming that the impact of Progeny's service on relatively low power indoor Part 15 devices may be greater than the impact on relatively high powered outdoor Part 15 devices.[118] The extensive testing that has already been completed on Part 15 devices designed primarily for indoor use demonstrates that this is not the case, such devices continued to function and convey their intended data without disruption in the presence of Progeny's M-LMS service.[119]

Several parties also introduced new arguments regarding the possibility of interference to specific Part 15 devices. As discussed in the following sections, none of these new arguments raises legitimate interference concerns regarding the spectrum sharing capabilities of Progeny's position location network.

---

[115] *Part 15 Parties Comments* at 6.

[116] *January 2012 Field Test Report* at 17 (listing both handheld and long range RFID readers among the tested devices); *id*. at 49 (showing no effect from Progeny beacons).

[117] *Compare RFK Paper* at 2 and 3 (arguing otherwise).

[118] *NAF/PK Comments* at 3.

[119] *See e.g. January 2012 Field Test Report* at 23, 28.

A. The Part 15 Test Process Did Not Detect any Evidence of Receiver Overload to Part 15 Devices so Further Speculation in this Regard is Unnecessary

One of the goals of the joint test process was to determine if receiver overload would result to Part 15 devices that were operated in very close proximity to Progeny's M-LMS beacons. During each round of the joint and unilateral test processes, no case of receiver overload was detected. Therefore, the repetitious and speculative comments of RKF regarding these issues can be disregarded.[120]

GE argues extensively in its comments about the possibility of receiver overload and blocking to Part 15 equipment.[121] GE claims that it is aware of Part 15 chipsets that exist that have an overload point of -53 dBm for any signal transmitting within 10 MHz above or below the operating frequency of the chipset.[122]

Any Part 15 devices that uses a chipset with such a poor near band overload characteristic as the one described by GE would only be able to operate in a narrow portion of the 902-928 MHz band because if it operated above 918 MHz or below 904 MHz, it would suffer receiver overload interference from high power uses in adjacent bands, such as paging in the frequencies immediately above and cellular in the frequencies below the 902-928 MHz band.[123]

---

[120] *RKF Paper* at 1.

[121] *GE Comments* at 5-6 and 8.

[122] *Id.* at 6.

[123] 47 C.F.R. § 2.106 (901-902 MHz is used for narrowband PCS, 928-929 MHz is used for the Multiple Address Service, and 929-930 MHz is used for the Paging and Radio Telephone Service).

Any such device would also suffer receiver overload whenever it was placed within a few hundred feet of other Part 15 devices.[124] Progeny has undertaken extensive field tests with a wide variety of Part 15 devices, including tests in worst case and break case operating conditions and none of those tests revealed any indication that receiver overload might result to the Part 15 devices under test. Therefore, GE's theoretical analysis regarding a supposedly highly intolerant Part 15 chipset is not consistent with the actual capabilities of chipsets that are used in real world operating conditions.

B. Plantronics' Unilateral Tests do not Show that its Wireless Headsets will Experience Unacceptable Levels of Interference from Progeny's Network

Plantronics claims to have conducted testing of its 900 MHz wireless headset products in the presence of Progeny's service in downtown San Jose. Plantronics acknowledges, however, that the only way it could get its wireless headsets to detect Progeny's M-LMS transmissions was to disable the automatic channel selection capabilities in the headsets.[125] In this disabled condition, Plantronics' headsets would be susceptible to noise from numerous sources of interference in the 902-928 MHz band, including noise from other wireless headsets.

Plantronics also indicates that it conducted its tests about one block from a Progeny transmitter where it reportedly detected M-LMS signal levels of around -55 dBm.[126] Even in these worst case conditions, Plantronics indicates that its wireless headsets were unable to detect

[124] Based on GE's assumptions about the limitations of its chipset, it can be anticipated that such a device would suffer receiver overload whenever it was placed within 250 feet of a Part 15 device operating at 1 Watt or within 500 feet of a Part 15 device operating at 4 Watts.

[125] *See Plantronics Comments* at 5.

[126] *Id.* at 4.

Progeny's signals unless the headsets were separated from their base stations by around 20 feet.[127]

Based on these contrived and worst case test conditions, Plantronics claims that the presence of Progeny's service could have two undesirable impacts on the operation of its wireless headsets. First, Plantronics claims that Progeny's M-LMS beacon signals will limit the range of its headsets because noise artifacts from Progeny's service will interfere with communications when the headsets are separated from their base stations by a significant distance.[128] Of course, noise artifacts from Progeny's service will not be detected by Plantronics' headsets if the headsets are permitted to operate as they are designed; the automatic channel selection capabilities of the headsets will prompt the device to shift to a different channel.

Plantronics further argues that the automatic channel selection capabilities in its wireless headsets may have difficulty correcting for the relatively low 10 to 20 percent duty cycle that is used by Progeny's M-LMS network, potentially shifting out of the band whenever a nearby Progeny beacon transmits, but returning to the same spectrum during the interval in which the Progeny beacon is silent.[129] The intermittent nature of Progeny's M-LMS transmissions, however, is very similar to FHSS devices that operate ubiquitously throughout the 902-928 MHz band, briefly transmitting in one segment of the band and then hopping to other channels before returning to that same channel for another brief moment. Progeny anticipates that Plantronics'

[127] *Id*. at 6.

[128] *Id*.

[129] *Id.* at 3.

headsets should be able to manage the low duty cycle nature of Progeny's M-LMS network in the same manner that its headsets respond to FHSS devices.

Finally, Plantronics argues that its wireless headsets may be unable to switch to other channels in dense user conditions (such as a call center) where large numbers of Plantronics' devices are being used simultaneously consuming all of the available channels.[130] In a large call center, however, most of Plantronics' headsets will likely be used at individual work stations at a relative close distance to their intended base stations and only a limited number of headsets will likely be employed by individuals that are roving throughout the building. Only those headsets that are being used at a significant distance from their base stations may detect sufficient signal artifacts from Progeny's service to switch to different channels. The numerous headsets operating reasonably close to their base stations will be able to operate across all the possible channels in the band including channels that are directly co-frequency with Progeny's service. It therefore appears highly unlikely that the presence of Progeny's position location service could cause Plantronics' wireless headsets to exhaust all available operating channels in the 902-928 MHz band.

Further, the practical solution described above will be needed only in worst case situations in which a large call center is located directly adjacent to a Progeny transmitter. In a more normal operating environment, Plantronics headsets will be able to operate at significantly greater distances from their base stations without the need to switch channels to avoid detection of Progeny's network. Therefore, Progeny's service can share the 902-928 MHz band with Plantronic's wireless headsets and will not cause unacceptable levels of interference to such devices.

---

[130] *Id*. at 6.

C. Progeny's M-LMS Network will not Prevent Reception or Otherwise Cause Unacceptable Interference to Inovonics' Channel Hopping Part 15 Devices

A second equipment manufacturer that has newly submitted comments in this proceeding is Inovonics, which indicates that it manufacturers security, senior care, and submetering systems that operate in the 902-928 MHz band. Inovonics expresses concern that Progeny's M-LMS network could prevent reception of its unlicensed services.

Although Inovonics markets its equipment for a variety of user applications, Inovonics acknowledges that all of its devices employ an FHSS channel plan in compliance with the Commission's rules.[131] Progeny has completed extensive testing with FHSS Part 15 devices, including its independent tests that were filed with the Commission in January 2012, and in the joint field tests with such parties as Itron and Landis+Gyr.[132] In each of these tests, the presence of Progeny's service, even in worst case co-located conditions, did not prevent FHSS Part 15 devices from functioning as intended, successfully transmitting and receiving the desired data. The numerous tests that have already been completed on FHSS Part 15 devices are therefore sufficient to conclude that Progeny's position location service will not cause unacceptable levels of interference, or otherwise prevent the operation of, Part 15 devices that employ FHSS technology.

[131] *Inovonics Comments* at 2.

[132] *See e.g. January 2012 Field Test Report* at 17 (noting four FHSS devices among the devices tested).

D. As Starkey Laboratories has Previously Explained to the Commission, its Hearing Aid Devices can Operate Compatibly with M-LMS Networks

Starkey Laboratories filed comments in response to the Commission's public notice indicating that it too is concerned about the potential for interference to Part 15 devices.[133] Starkey is a manufacturer of hearing aids, including hearing aids that employ wireless links using the 902-928 MHz band. Starkey's letter provides no detail about the technical design of its wireless hearing aids even though such information is critical to assessing its spectrum sharing capabilities with Progeny's M-LMS network. In previous filings with the Commission, however, involving a petition that Starkey filed to change certain rules for Part 15 devices, Starkey provided significant detail about the hearing aids that it manufacturers to operate in the 902-928 MHz band.[134]

Starkey explained to the Commission that "frequency hopping spread spectrum ("FHSS") and direct sequence spectrum ("DSSS") are not viable options for communicating with hearing aids due to their increased signal processing and power requirements."[135] Instead, Starkey explained in an *ex parte* letter to the Commission that

> Starkey employs the use of an adaptive frequency selection algorithm by the host device that monitors the channel for a clear portion of spectrum in which to operate. The host device selects the channel for use. By selecting a clear channel for operation, Starkey assistive listening devices avoid harmful interference from other wireless systems and additionally minimize interference to other wireless devices from the Starkey assistive listening systems.[136]

---

[133] Comments of Starkey Laboratories, Inc., WT Docket No. 11-49 (filed Dec. 21, 2012).

[134] *See Ex Parte Filing of Starkey Laboratories*, RM-11523, at unnumbered page 3 (Oct. 8, 2008).

[135] *Id.*

[136] *Id.*

It is important to note that Starkey's statement above appears to have been in direct response to a question that was presented to Starkey by the staff of the Office of Engineering and Technology.[137] Further, the question presented to Starkey (which was copied in Starkey's letter) not only references the need for Starkey's devices to operate compatibly with Part 15 devices, but also specifically referenced the issue of spectrum sharing with LMS networks. Therefore, by its own assurances to the Commission, Starkey has already considered the spectrum sharing issues involved in operating in a spectrum band the upper portion of which is licensed for use by M-LMS network and Starkey's use of adaptive frequency selection techniques avoids the possibility of interference to or from such systems.

VI. M-LMS AND NM-LMS LICENSEES ARE REQUIRED TO SHARE THE 919.75-921.75 MHZ BAND ON A CO-EQUAL BASIS AND, TO THE EXTENT NM-LMS LICENSEES ARE ACTUALLY USING THE SPECTRUM, PROGENY WILL COMPLY WITH THESE REQUIREMENTS

A manufacturer and several large users of non-multilateration location and monitoring ("NM-LMS") devices also filed comments in response to the Commission's public notice. Most of their comments are largely identical to comments that they made in March 2012 with respect to the Part 15 test report that Progeny filed with the Commission on January 27, 2012.

Two of the parties, E-ZPass Group and the MTA Bridges and Tunnels agency, clarified their previous comments, however, by explaining that they both use the 915 MHz frequency band for their electronic toll collection systems, further explaining that the 915 MHz band

> is the same frequency which all electronic toll collection systems in the United States currently operate on, as well as in other systems such as the commercial vehicle highway weigh station preclearance systems which is a major part of the US Department of Transportation's Federal Motor Carrier Safety

[137] Copies of OET's questions appear to be included in Starkey's letter to the Commission.

Administration's Commercial Vehicle Information Systems and Networks ("CVISN").[138]

Of course, Progeny is not licensed to operate at or near the 915 MHz band. Further, the PER test results that have been filed with the Commission clearly show that Progeny's beacon signals have an extremely tight roll off, disappearing below the noise floor well above 915 MHz. Therefore, no possibility exists that Progeny's service could cause interference in any form to NM-LMS networks operating at 915 MHz.

To the extent that other N-LMS devices may be operating in the spectrum that is shared by NM-LMS and M-LMS networks (919.75-921.75 MHz) – and Progeny has found no evidence that this is the case – Progeny's position location service can function cooperatively with such networks. As the Commission explained when it adopted rules for the M-LMS and NM-LMS services, the two services "will share the 919.75-921.75 MHz band on a co-equal basis."[139] The Commission instructed that such sharing must be accomplished in accordance with Section 90.173(b) of the Commission's rules, which requires licensee, *inter alia*, to "cooperate in the selection and use of frequencies in order to reduce interference and make the most effective use of the authorized facilities."[140]

To this end, Progeny remains prepared to cooperate with NM-LMS licensees in Progeny's selection of M-LMS transmitter locations. Progeny is deploying its beacons primarily at the highest available points on existing broadcast, paging or cellular towers, while NM-LMS equipment is installed primarily on highways. Given the significant divergence of these

[138] *See* Comments of The E-ZPass Group, WT Docket No. 11-49, at 2 (filed Dec. 17, 2012); Comments of MTA Bridges and Tunnels, WT Docket No. 11-49, at 1-2 (filed Dec. 21, 2012).

[139] 47 C.F.R. § 90.353(d).

[140] *See LMS MO&O* ¶ 50 n.91 (citing 47 C.F.R. § 90.173(b)).

transmitter deployment approaches, it should not be difficult for Progeny and NM-LMS licensees to cooperate adequately in their shared use of the spectrum. Therefore, the Commission should reject Kapsch Trafficcom's request that efforts at spectrum sharing should be abandoned and Progeny's licensed service should be required to move out of the 919.75-921.75 MHz band.[141]

As Progeny explained previously, its M-LMS network employs significant and effective interference mitigation techniques that will reduce exponentially the potential for interference to other users of the 902-928 MHz band, including to any NM-LMS licensees that may be operating in the shared 919.75-921.75 MHz portion of the band. Many of the mitigation techniques are detailed in earlier sections of this response. The most important interference mitigation measure employed by Progeny is the elimination of high power return link transmissions from vehicles and other tracked devices operating with Progeny's M-LMS network. Such return link transmitters would have operated in immediate proximity to Kapsch Trafficcom's toll collection equipment.

Kapsch Trafficcom flatly rejects consideration of the substantial interference mitigation measures that Progeny has employed, retorting that Progeny's assertions "lack any form of evidentiary support."[142] Kapsch Trafficcom also appears to reject its obligations as an NM-LMS licensee under the Commission's rules to "cooperate"[143] with fellow primary licensees in order to "share the 919.75-921.75 MHz band on a co-equal basis."[144] Instead, Kapsch Trafficcom

---

[141] *See* Comments of Kapsch Trafficcom IVHS Inc., WT Docket No. 11-49, at 6 (filed Dec. 21, 2012).

[142] *See id.* at 6.

[143] *LMS MO&O*, ¶ 50 n.91.

[144] 47 C.F.R. § 90.353(h).

demands preferential treatment in the band either through the removal of Progeny's service from the spectrum, or through arrangements in which Progeny's operations would be subject to new power and operating limits developed by the NM-LMS community, and which would require Progeny to move its facilities to make way for future NM-LMS sites.[145] Obviously, such demands are incompatible with cooperative and co-equal spectrum sharing. Nevertheless, Progeny stands ready to work with NM-LMS licensees to ensure the cooperative and shared use of the 919.75-921.75 MHz spectrum to the extent that the spectrum is actually being used by NM-LMS licensees for their services. Therefore, no need exists for the Commission to revisit its longstanding spectrum sharing rules for the M-LMS and NM-LMS services.

VII. PROGENY'S M-LMS SYSTEM RESPONDS TO A CRITICAL PUBLIC INTEREST NEED FOR E911 LOCATION INFORMATION

As the Commission and the public safety community have repeatedly recognized, the ability to locate callers during emergency situations is a critical public safety need, particularly for those callers using mobile devices.[146] Mobile devices have become the phone of choice for many people, and today more than 70 percent of the nation's nearly 250 million E911 calls are placed through cellphones.[147] For many emergency callers, even those calling from home or indoors, a cell phone is the only phone available.[148]

---

[145] *See id.* at 6-7.

[146] *See E911 Third Report and Order*, ¶ 81; *Revision of the Commission's Rules To Ensure Compatibility with Enhanced 911 Emergency Calling Systems, CC Docket No. 94-102*, Report and Order and Further Notice of Proposed Rulemaking, RM-8143, ¶ 5 (rel. July 6, 1996).

[147] *For 911 calls, is a cell phone as safe as a landline?*, CONSUMER REPORTS, Jan. 2011.

[148] *Id.*

To this end, Progeny has recently completed participation in the indoor location accuracy testing organized by the Commission's Communications Security, Reliability and Interoperability Council ("CSRIC III") Working Group 3 ("E-9-1-1 Location Accuracy").[149] The testing, carried out in the San Francisco Bay Area, was intended to respond to the Commission's outstanding questions regarding the capabilities of indoor location accuracy across all technologies and operating environments. Progeny believes that the test results, due out in March 2013, will demonstrate that Progeny's M-LMS system achieves reliable, high-accuracy location determination even indoors and, in doing so, provides an important tool in the service of the public interest.

Progeny's M-LMS system not only provides rapid, reliable, and accurate location information, but also expands these capabilities into the challenging location-determination environments that characterize major urban areas, such as indoors and in urban canyons. In addition, Progeny believes that its technical approach represents the only known viable option for determining precise "floor level" vertical location in high multistory buildings, thus meeting a critical public safety need in urban markets. Current generation technologies have improved, but generally still fall far short of the necessary accuracy and speed, as well as lacking vertical location capabilities and often being unavailable indoors where increasingly many emergency calls are made.[150] Although the Parties attempt to dismiss the value of M-LMS in light of other

[149] *Indoor Accuracy - Test Bed Framework*, CSRIC III Final Report (September 12, 2012) (available at http://transition.fcc.gov/bureaus/pshs/advisory/csric3/CSRICIII_9-12-12_WG3-Final-Report.pdf); *ATIS Provides Test Bed Plan for Evaluating Location Accuracy for Indoor E9-1-1 Calls*, ATIS (Dec. 4, 2012) (available at http://www.atis.org/PRESS/pressreleases2012/120412.html).

[150] *See e.g.*, Comments of APCO, Docket Nos. 11-153 & 10-255, at 4 (Dec. 12, 2011).

technologies being developed,[151] the comments of the National Emergency Number Association ("NENA") reiterate that "development and deployment of advanced location technologies is critical to the future of emergency calling systems and public safety response capabilities" and that for this purpose "we […] consider it important to support the Multilateration-Location and Monitoring Service."[152]

The relative merits of various technologies in service of this important public interest will ultimately be determined through actual usage. For the present, however, as NENA has indicated, it is important for the Commission to focus on providing a regulatory environment conducive to the development of all technologies that show promise toward resolving the indoor location issue. Progeny's service operates in spectrum specifically licensed for location and monitoring, has nationwide build-out, and responds to the specific shortcomings of current generation location technologies identified by the Commission and public safety entities.[153] It is therefore strongly in the public interest and the Commission should authorize Progeny to begin commercial service without delay.

[151] *Part 15 Parties Comments* at 7.

[152] *Comments of NENA The 9-1-1 Association*, WT Docket No. 11-49 (filed Dec. 21, 2012) ("*NENA Comments*").

[153] *See e.g. Technical Options for E9-1-1 Location Accuracy*, CSRIC II Working Group 4C, Final Report at 9.3.4 (March 14, 2011); *WG 3: E9-1-1 Location Accuracy*, CSRIC III Working Group 3 (available at http://transition.fcc.gov/bureaus/pshs/advisory/ csric3/WG%203.pdf).

VIII. THE COMMENTS OF WARREN HAVENS ARE LARGELY IRRELEVANT TO THIS PROCEEDING AND SHOULD BE DISREGARDED

Finally, Progeny briefly addresses several arguments made by Warren Havens individually and through five of his various legal entities ("Havens").[154] As discussed below, none of Havens' comments are relevant to the issues before the Commission in this proceeding.

First, Havens expresses his long repeated arguments regarding the Commission's original issuance of M-LMS licenses to Progeny more than a decade ago and their current validity.[155] Those issues were carefully considered and resolved by the Commission in Progeny's favor in an order released by the Chief of the Mobility Division on May 31, 2012 and they do not warrant reexamination here.[156]

Havens also argues in his comments that the Commission should not permit Progeny to file Part 15 test results on a confidential basis and any such confidential filings should be struck from the record.[157] If Havens had read Progeny's joint test reports, however, he would have realized that it was not the test results that were filed confidentially, but proprietary information regarding the design and operation of certain of the Part 15 equipment that was subjected to tests. Havens claims that "[t]here is nothing confidential about the existence of a Part 15 network."[158]

---

[154] Comments of Skytel, WT Docket No. 11-49 (filed Dec. 21, 2012) ("*Havens Comments*").

[155] *See id.* at 2-3.

[156] *See* Application for Transfer of Control of Progeny, LMS LLC to Progeny LMS Holdings LLC (ULS File No. 0003250058) and Notification of the Consummation of the Transfer of Control of Progeny LMS LLC to Progeny LMS Holdings LLC (ULS File No. 0003274382), Order, DA 12-851 (WTB, May 31, 2012).

[157] *See Havens Comments* at 3.

[158] *Id.*

The companies that manufactured the Part 15 devices that were tested, however, appear to disagree.

Havens then repeats his previous arguments that Progeny should be required to use its M-LMS network solely for tracking vehicles and not for tracking wireless devices to support E911.[159] The Commission directly addressed this issue, however, in the order granting to Progeny certain waivers of the rules concluding that M-LMS was never intended to be used solely for intelligent transportation services.[160]

Havens then makes a rather novel argument that Progeny must test a return path link in the 902-928 MHz band because "radiolocation is not effective if not communicated back to the system."[161] As Progeny has explained repeatedly, however, Progeny's position location service will not employ a return path in the 902-928 MHz band and therefore no need exists to test such a function. Location information for tracked devices will instead be generated by the devices themselves. To the extent that this information needs to be communicated to third parties, such as a public safety answering point ("PSAP"), this will be completed using a separate return path outside the 902-928 MHz band such as over cellular networks as part of the E911 call flow.

Havens also suggests that Progeny must test its M-LMS network with NM-LMS systems.[162] This is not, however, what the Commission's rules require. Finally, Havens argues that Progeny must test its M-LMS network using both its B block and its C block spectrum.[163]

---

[159] *See id.* at 6-8.

[160] *See Progeny Waiver Order*, ¶¶ 22 and 30.

[161] *See Havens Comments* at 7.

[162] *See id.*

[163] *See id.*

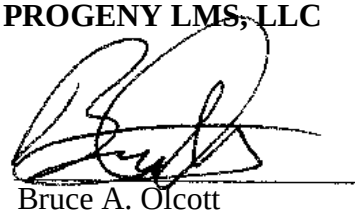
This is, of course, exactly what was done. Given these facts, Havens' comments should be disregarded by the Commission.

IX. CONCLUSION

For the reasons provided herein, the Commission should conclude that the extensive testing that has been completed during the past 18 months on Progeny's M-LMS network has clearly demonstrated that its M-LMS network will not cause unacceptable levels of interference to Part 15 devices and therefore Progeny can makes its critically-needed position location service available to the public safety community, wireless carriers, and consumers.

Respectfully submitted,

PROGENY LMS, LLC



Bruce A. Olcott
Preston N. Thomas
Squire Sanders (US) LLP
1200 Nineteenth Street, N.W.
Washington, D.C. 20036
(202) 626-6615

Its Attorneys

January 11, 2013